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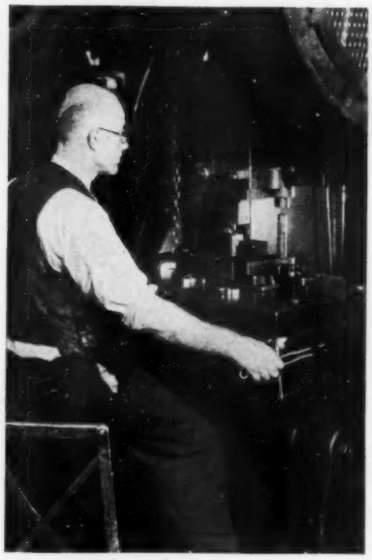

Die Decisions—Just how elaborate a die set should be made is a question that arises continually in shops where quantities vary from small lots to large production. (Page 652.)

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July 28, 1937

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AMERICAN MACHINIST is the preferred paper of production men in the metal working field.

★

More production men pay to read American Machinist than any other paper.

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Talking Shop

Hot Weather Imagination

Builders of air conditioning equipment are finding an obstacle in the vagaries of human imagination or psychology. We recently visited a moderate sized plant with the work rooms

made very comfortable by a real air conditioning plant. They are moving to a new location, however, and will only air condition the office and a few rooms where constant temperature is necessary for the work. The reason for backsliding is that many of the workers growl at the closed windows on a hot day. Notwithstanding the evidence of thermometers in and out of the plant, the sight of a closed window causes a rise in mental temperature, so the new plant will be minus a lot of equipment that is not only costly to install but also to operate. It wasn't a question of economy, as the concern is very liberal in all such matters. Grouching at closed windows did the trick. So it's up to air conditioning men to bring on their psychoanalists, or hypnotists, or what have you.

Lighter Alloys

Several startling examples of the possibilities of weight reduction were shown in the recent railway exhibits at Atlantic City. Among them were striking contrasts showing applications to car axles and to beams, both simple and cantilever. One comparison showed car axles of the same size, one steel and one of Alcoa aluminum alloy. The steel axle weighed 330 lb., the other 81 lb. Both were subjected to 12 blows of a 2,000-lb. drop from varying heights up to 98 in. The steel axle took a set of 7.23 in. as against 6.34 in. for the lighter axle.

Another striking example was a stainless steel cantilever beam supporting a distributed load in the shape of a sheet of plate glass 11 ft. 7 in. long and weighing 680 lb. The beam weighed 80 lb. Freight cars of lighter construction and using lighter alloys are also making their way into regular use. All advances of this kind mean more efficient operation.

Chuck Hoists

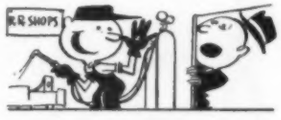
Why do so many employers and machine tool designers take it for granted that all lathe hands weigh at least 200 pounds and can juggle 150-pound chucks with ease? A reader who admits to weighing only 110 pounds but who stoutly maintains that he is one of the best lathe hands in the business wants to know.

He says he would be a much more

productive unit in the shop if his machine were equipped with some sort of a simple hoist for use when he has to change from a four-jaw independent to a three-jaw universal chuck, or vice versa. Probably other "shrimps" feel the same way about it.

Depends on Who Uses It!

It makes a difference who does the work and how much it is needed. Parts made in one's own shop seldom receive as rigid inspection as work from the outside. Rejections too, often depend on how badly the parts are needed. We ran across a variation of this at the Railway Exhibit in Atlantic City recently. Makers of cutting torches were showing excellent examples of large connecting



rods outlined completely from the billet, holes and all, as used on some railroads. A locomotive builder, however, declared that when the railroads bought locomotives from him they forbid the use of the torch in cutting, on account of the alleged detrimental effect on the metal. "They use the torch themselves but they won't let us."

Lights

The superintendent of a well-laid-out shop recently put in a high-quality lighting installation with white diffusers over the lamps. Intensity of illumination on the benches was 28 lumens per sq. ft., a rather high value as shop illumination goes. Imagine his surprise to hear from the men that their eyes bothered them. His eyes were not affected, so he put their grumbling down to reaction against change. But one Saturday afternoon he was spending some time in the shop, and at one time removed his spectacles. After a while his eyes were affected also. Upon putting on the spectacles he noticed that the trouble disappeared. Then he tumbled. The lenses were made of Crookes glass, a tinted material that is prescribed for light-sensitive eyes. So his shop now has bluish daylight-type diffusers over the lamps, and everybody is happy with plenty of eye-saving, glareless and shadowless illumination. —*The Editors.*

RESPONSIBILITY

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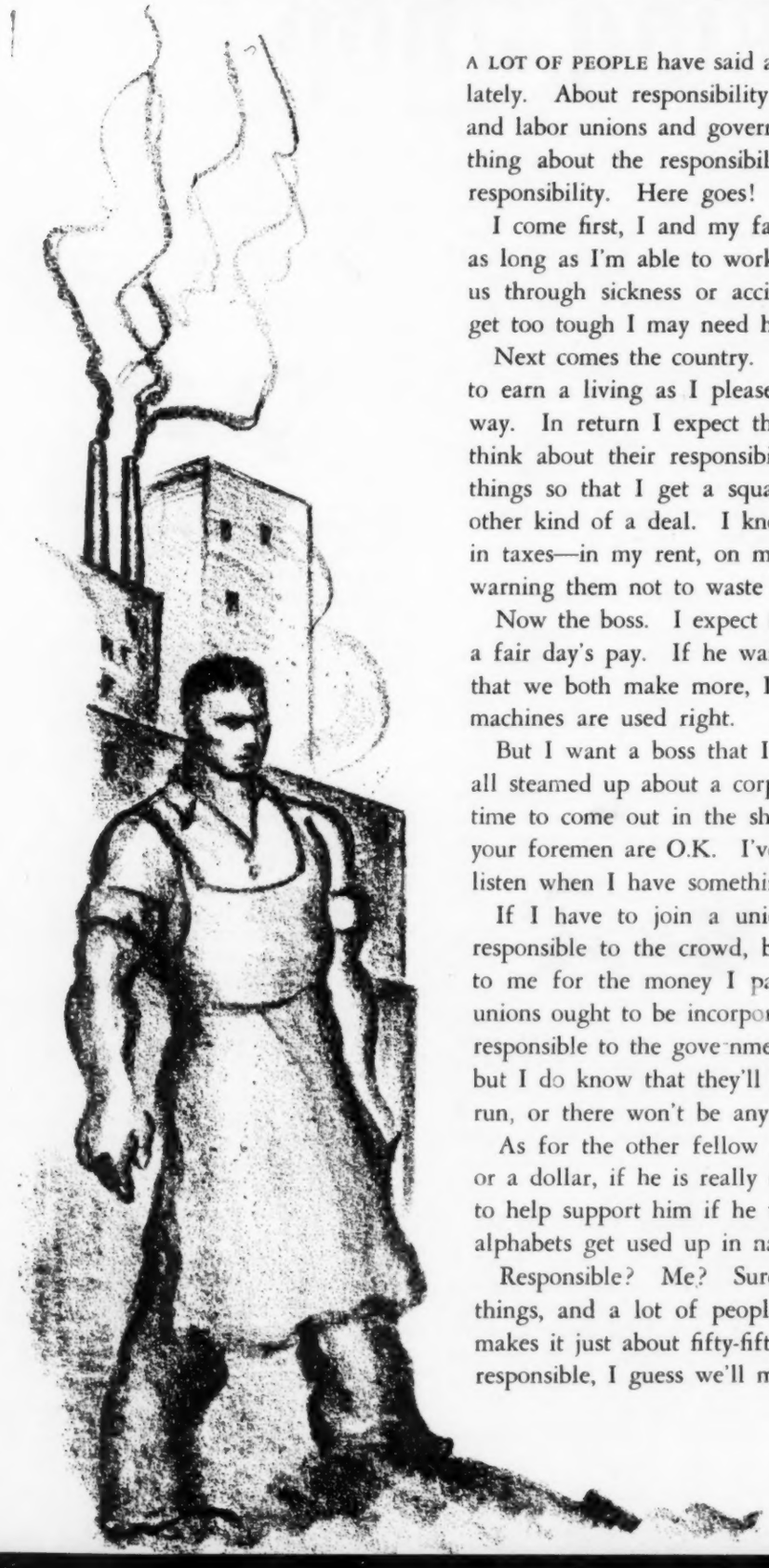
A Worker's Slant



A LOT OF PEOPLE have said a lot of things about responsibility lately. About responsibility of employers, and corporations, and labor unions and government. But I haven't heard anything about the responsibility of the employee—about my responsibility. Here goes!

I come first, I and my family. It's my job to support us as long as I'm able to work. And to do what I can to see us through sickness or accident and hard times. If things get too tough I may need help only as a last resort.

Next comes the country. I built it so that I could be free to earn a living as I please, and I'm going to keep it that way. In return I expect the fellows who are running it to think about their responsibility to me. Their job is to fix things so that I get a square deal—I don't care about any other kind of a deal. I know I'm paying them good money in taxes—in my rent, on my food, on my smokes—and I'm warning them not to waste it. I have the votes.

Now the boss. I expect to give him a fair day's work for a fair day's pay. If he wants to put in better machinery so that we both make more, I'm for that and I'll see that the machines are used right.

But I want a boss that I can see and talk to; I can't get all steamed up about a corporation. Maybe you haven't got time to come out in the shop, boss, but if not be sure that your foremen are O.K. I've got to have somebody who will listen when I have something on my chest.

If I have to join a union to get a square deal I'll be responsible to the crowd, but the union will be responsible to me for the money I pay them. I don't know whether unions ought to be incorporated or whether they ought to be responsible to the government or to employers or to the law, but I do know that they'll be responsible to me in the long run, or there won't be any.

As for the other fellow I'll be glad to lend him a hand, or a dollar, if he is really up against it. But I'm not going to help support him if he won't work, no matter how many alphabets get used up in naming the hand-out committees.

Responsible? Me? Sure, I'm responsible. For a lot of things, and a lot of people are responsible to me. Which makes it just about fifty-fifty. So long as we all know we're responsible, I guess we'll make out.

AMERICAN MACHINIST

Cold-Heading Die Steels

Depth of hardening should be proportional to size of die and steel should be selected accordingly

C. E. HERRINGTON

CLOSE COOPERATION between the steel maker and his customer results in progress for both. Mutual scientific research in the cold heading industry has led to new knowledge concerning die steel structure and treatment, resulting in an increased product quality.

Prior to 1930 it was commonly believed that a large grain die steel was preferable for cold-heading work. A large number of dies which had given good service had been found to have this common characteristic. It was assumed at that time that the large grain structure provided a cushioning effect.

However, by 1930 it was becoming apparent that *depth of hardening* was a more important factor than large grain size. It was believed by many that the dies which had been found to have large grain structure were good in spite of their grain size, rather than because of it.

Practice soon proved this to be correct and the cold-heading industry became actively interested in the steels they were using for their dies and hammers. Steel manufacturers, in turn, began to do extensive research on steels for this type of work. A quick review of what has been done by one steelmaker, the Jessop Steel Company of Washington, Pa., will show the extent of this manufacturer's cooperation.

Result of Research

Working from the standpoint that depth of hardening was the important factor, members of the research staff established, by experiment, the fact that proper control of manganese content of a steel will, provided subsequent treatment is correct, predetermine the depth of hardness penetration. It was also discovered that there existed a proportion between grain size and the depth of hardness penetration. Large grain steels permit greater depth, small grain a shallow depth. As a result, die steels are known as either "shallow hardening" or "deep hardening," depending upon the depth to which the hardness penetrates when the steels are subjected to identical hardening processes.

Thin Case for Small Dies

When the facts were first made known, it was inferred that deep penetration would result in greatest durability. Experience has proved, however, that such is not the case. Small dies, similar to the one shown in Fig. 1, made from a deep-hardening steel, have been found to have a tendency to split. On the other hand, large dies, like that shown in Fig. 2, made from a shallow-hardening steel, may crack early or may "sink" since the hard body is too thin to withstand the pressure exerted upon it.

It follows, therefore, that depth of hardening should be proportional to the size of the die and die-steel should be selected accordingly. Knowledge of these facts enables the die maker to estimate, after noting the grain size and the manganese content of his steel, what size dies can best be made from the material in his stock.

By working closely together on such problems, the cold-heading producers and the steel makers were able to effect material improvements in the handling of die steels in the user's plant. Perhaps the chief improvement may be said to be pressure quenching. Under the old system of immersing the die in a quenching bath, even though the bath be circulating or the die be agitated, hard and soft spots often results because of non-uniform cooling rates. Hard and soft spots cause undue stresses

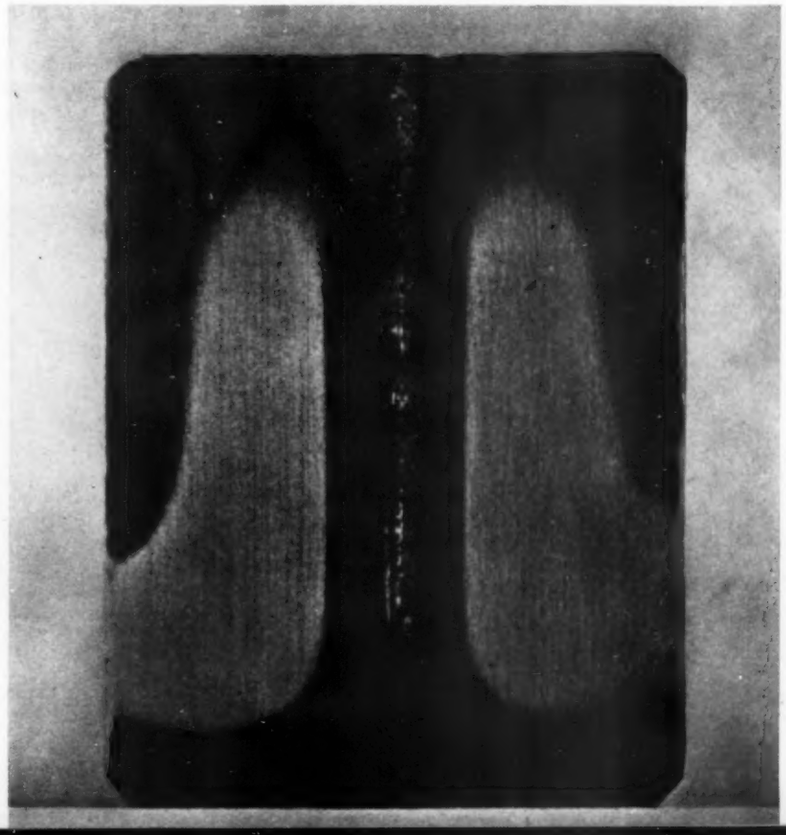


Fig. 1. This die gave poor service because it was made from a large-grain, deep-hardening steel which resulted in too deep a case. Black areas, which have been etched, reveal depth of penetration

in the die when in use. These stresses often cause die failures or result in non-uniformity of product.

In pressure quenching, the quenching medium is forced on to the die and into its holes or cavities at a pressure varying from 10 to 20 lb. per sq. in., depending upon the size of the die. This assures a uniform cooling rate and a uniform depth of hardening or case.

Variations in hardening temperatures has been studied for various die sizes. These studies have revealed the fact that a large die should be hardened at a somewhat higher temperature than a small one.

Electric-furnace steel has been found of much value in making cold-heading dies. Properly controlled electric furnaces produce clean steel and any excessive impurity or a large inclusion in the steel may become a point of stress concentration in the finished die.

Improved Machines

Machine tool builders, knowing that improved cold-heading die steels are available, have supplied heavier and more rigid machines. Steels, as now made, are able to withstand the terrific pressures necessary in cold-heading work. This has permitted greater precision in the matter of setting up the die in the press and greater accuracy in adjustment of clearances. The importance of proper equipment, its maintenance and correct operation, as an aid to the efficient productivity of the die has been recognized and given close attention. Troubles frequently have been eliminated through careful machine adjustment and control.

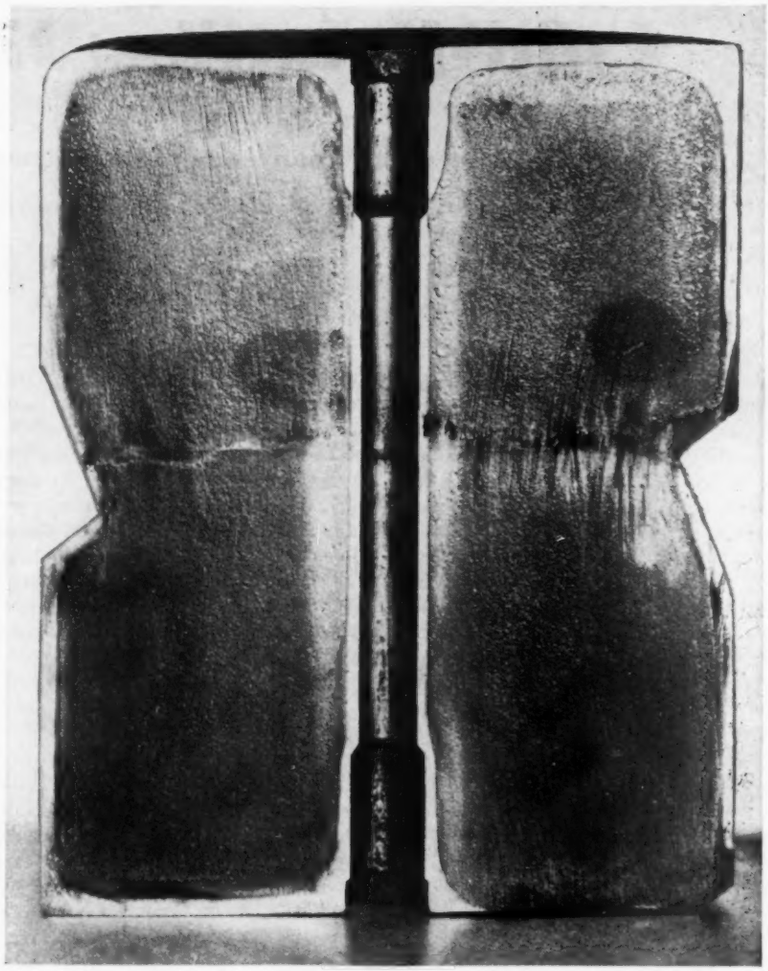
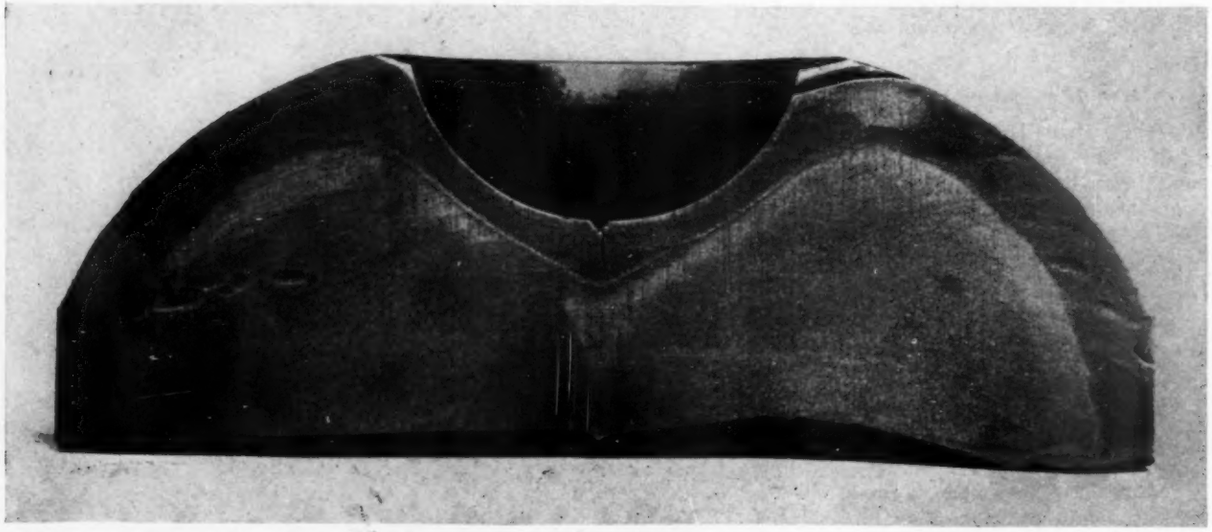


Fig. 2. Penetration was too shallow for this large die, which was made from a fine-grain, shallow-hardening steel. Note non-uniform case revealed by etching

Fig. 3. Correct hardness penetration resulted in good production service obtained with this large button-header die



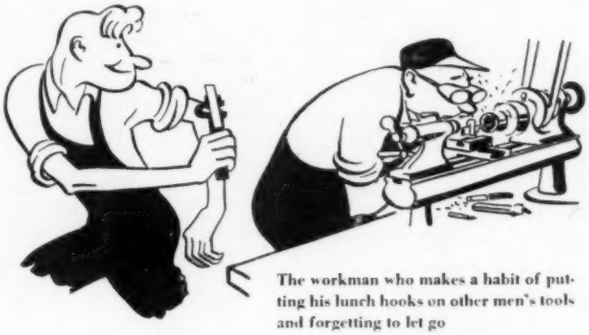
Job Shop Pests

CHARLES WESLOW

There's one in almost every shop, but they're not all alike. Here are a few familiar types:

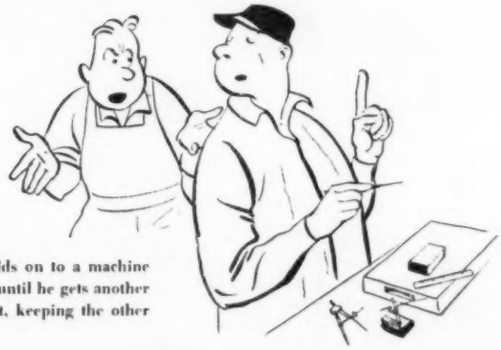
The toolmaker who is forever horning in on the other men's jobs: those who know the least are the worst kibitzers

The job-seeking diemaker who carries "samples" from dies that he has made. Show him your own samples and ask how he would make a die for them; or better yet have your foreman interview the applicant

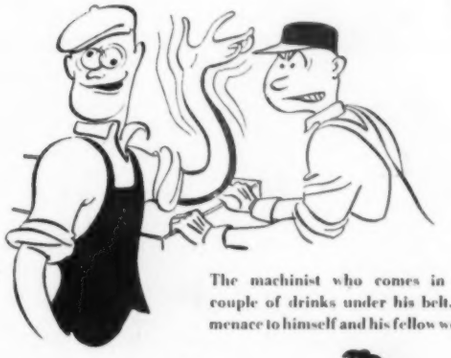


The workman who makes a habit of putting his lunch hooks on other men's tools and forgetting to let go

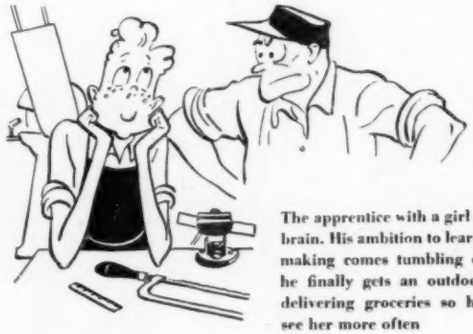
The life of the party who entertains the gang during lunch hour so he can borrow from them during working hours



The fellow who holds on to a machine for an hour or two until he gets another part prepared for it, keeping the other men waiting



The machinist who comes in with a couple of drinks under his belt. He's a menace to himself and his fellow workmen



The apprentice with a girl on his brain. His ambition to learn toolmaking comes tumbling down; he finally gets an outdoor job delivering groceries so he can see her more often

The shop style expert who discusses what kind of suit he will get his tailor to make up next. He'd be himself again if he ever got married, but fellows like that never save the price of a handcuff

Method Selection *in the Punch Shop*

Control of manufacturing methods in a punch press shop is a complex problem. Selection of the best way to produce each order must depend on the quantity involved

S. C. McDOWELL

Time Study Department,
Westinghouse Electric & Manufacturing Company,
East Pittsburgh Works

MANUFACTURING plants are constantly faced with the problem of selecting the one best method to be used in producing a specified quantity of a given unit. This is particularly true in punch shops where any one of a number of methods often can be used to make the same part.

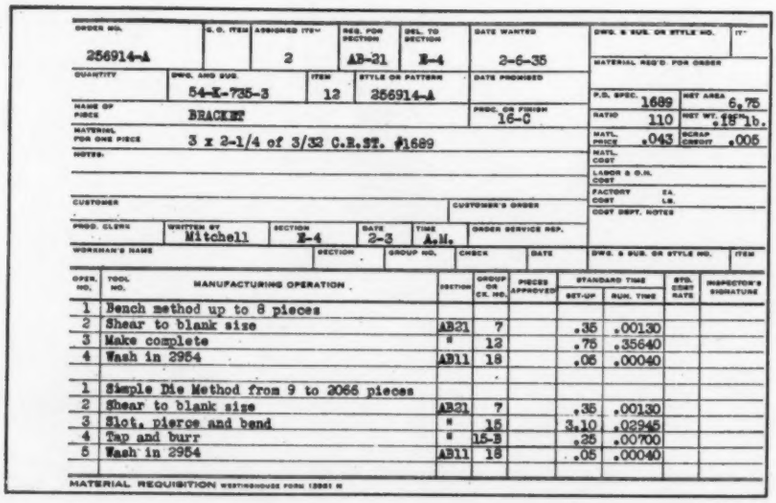
Where repeat order quantities fluctuate according to rapidly changing market requirements, or to suit customers' demands, the problem can be very complex. Often each order must be reviewed prior to actual fabrication. To review each order and make adjustments to insure use of the most efficient method involves considerable clerical routine.

In a small shop, where few items are made such a review of each order may be of small consequence. When practiced in a larger shop, such reviews greatly increase overhead expense. A record of the method used for the first order will make a second review unnecessary, so long as the quantity to be made permits economical production by the original method.

All items manufactured in the punch shop do not change radically in quantity each time they are ordered. There are usually a number of parts, however, that fluctuate widely in order quantities; if these are not properly handled an inefficient condition will be created. Considerable loss of both time and money can be experienced.

One of the duties of the Time Study department in the East Pittsburgh plant is to layout the sequence of operations to be followed by the shop when fabricating a metal stamping. Our recorded activity list involves some 50,000 different items. Approximately 500 new items are added each month. Daily orders, including both new and repeat jobs, approximate 425; these are handled by five Time Study men. It has been found impractical to review each order before it is issued to the shop owing to attendant interference with production schedules and clerical routine. Therefore a system has been devised to analyze only those items which have changed in quantity sufficiently to warrant a more efficient method of manufacture. This system has proved to be the most convenient and accurate used to date.

To set up this system, the various production methods in use were reviewed and several chosen which best suited our shop. Any specialized methods for exceptionally large quantities will not be considered here, for an item requiring a highly specialized setup is so prominent that there is no danger of it being manufactured by any other method. Methods chosen as a manufacturing basis are the bench, the simple die, the interchangeable shoe and the compound die methods.



ORDER NO. 256914-A | G. O. ITEM | ASSIGNED ITEM 2 | REQ. FOR SECTION AB-21 | DEL. TO SECTION E-4 | DATE WANTED 2-6-35 | DWG. & SUB. OR STYLE NO. | IT

QUANTITY | DWG. AND SUB. 54-E-735-3 | ITEM 12 | STYLE OR PATTERN 256914-A | DATE PROMISED | MATERIAL REQ'D. FOR ORDER

NAME OF PIECE BRACKET | PROD. OR FINISH 16-C | P.D. SPEC. 1689 | NET AREA 6.75

MATERIAL FOR ONE PIECE 3 x 2-1/4 of 3/32 C.R.ST. #1689 | RATIO 110 | NET WT. .15 lb.

NOTES: | MATL. PRICE .043 | SCRAP CREDIT .005

MATL. COST | LABOR & O.H. COST | FACTORY COST EA. LB.

CUSTOMER | CUSTOMER'S ORDER | COST DEPT. NOTES

PROD. CLERK | WRITTEN BY Mitchell | SECTION E-4 | DATE 2-3 | TIME A.M. | ORDER SERVICE REP.

WORKMAN'S NAME | SECTION | GROUP NO. | CHECK | DATE | DWG. & SUB. OR STYLE NO. | ITEM

OPER. NO.	TOOL NO.	MANUFACTURING OPERATION	SECTION	GROUP OR CK. NO.	PIECES APPROVED	STANDARD TIME SET-UP	STANDARD TIME RUN. TIME	STD. COST RATE	INSPECTOR'S SIGNATURE
1		Bench method up to 8 pieces							
2		Shear to blank size	AB21	7		.35	.00130		
3		Make complete	"	12		.75	.35640		
4		Wash in 2954	AB11	18		.06	.00040		
1		Simple Die Method from 9 to 2066 pieces							
2		Shear to blank size	AB21	7		.35	.00130		
3		Slot, pierce and bend	"	15		3.10	.02945		
4		Tap and burr	"	15-B		.25	.00700		
5		Wash in 2954	AB11	18		.05	.00040		

MATERIAL REQUISITION WESTINGHOUSE FORM 13061 H

Bench and simple-die methods are used interchangeably, depending on the number of pieces ordered. Both methods are, therefore, recorded on the same operation record card

Simple Tools

The bench method is used when it is undesirable to set-up machines and uneconomical to make any form of dies, owing to the small quantity of pieces to be made. Details are formed completely by hand with ordinary bench tools.

Simple-die methods are used when

the quantity of pieces to be made is too great to be formed on the bench, and is still not large enough to warrant making dies. These first two methods, when properly recorded for the same item, can be used as required—depending on the quantity of pieces on order. Simple dies are so named because they perform only one operation at a time. An example would be a detail requiring the punching of two holes. This would require two separate operations and a change of gages to punch the holes.

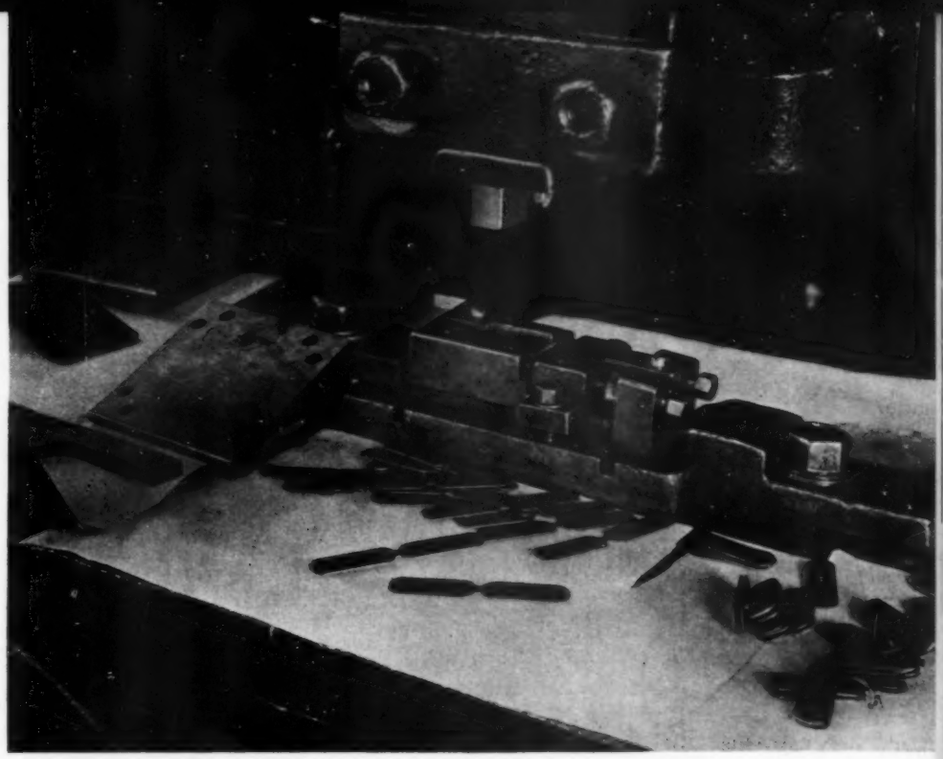
The interchangeable die shoe method is used when the quantity of pieces is too numerous to use the simple die method and yet is not of sufficient quantity to warrant construction of an expensive die. In this method the dies perform several operations at one stroke of the press, and they are constructed with only sufficient details attached to facilitate their economical operation. A common die shoe, into which the dies are clamped and removed each time they are used, is provided. This method was created to fill the gap between the simple die and the compound die methods. Interchangeable dies are made so that the addition of certain details and a die shoe will convert the tool into a compound die. This method, once used, is never superseded by either of the first two methods.

Compound Dies

Compound dies are used when the quantity of punchings to be fabricated are sufficient to warrant an increased die cost. Dies for this method are complete in every detail and their operation is the most economical of the four mentioned methods. It is only superseded by some specialized method.

There are two major factors to be considered when choice of method is made; these are tool or die cost and labor cost.

No die cost is included in bench method estimates, but the cost of hand tools and their upkeep is prorated to all items so made as part of an expense charge. Similarly, the cost of making simple dies is absorbed in an expense account and charged indirectly to the item concerned.



Inexpensive blocks and clamps are used in the simple tool method. Small quantities of clips are economically produced in this bender

Die cost for the interchangeable die and the compound die methods are added directly to the labor cost of the item for which the tool is made.

Type of labor necessary for the different methods varies widely, due to the nature of the work involved. It would be impractical to have a skilled bench workman operating a punch press when a less skilled workman could do the work. Labor consists of bench hands for the bench method, die setters for the simple die method and die setters and punch press operators for the remaining two methods. Female punch press operators are used wherever the nature of the work permits.

Ratio of Costs

Time required for the fabrication of a stamping by the bench method is greater than by the simple die method, but the set-up time involved is less. In the interchangeable shoe method both the set-up and operating time is less than that required by the simple die method, yet is greater both in set-up and operating time than is necessary for the compound die method. Table No. I lists average relations of each method compared with the bench method.

Limits Specified

When the first order is received provisions are made to care for future fluctuations in quantities. To do this specifications are recorded directly on the write-up of operations being used. As an example of how this system functions, the changes made in methods used to manufacture a small bracket are given in Table No. II. This bracket is used in an electric circuit breaker, which is becoming more popular each year. In June 1932 several pieces were ordered by our Experimental Division and subsequently several more very small orders were received while the circuit breaker was still in the experimental stage. From long practice and experience it is possible for the Time Study Man to estimate at what quantity the simple die method should supersede the bench method. In this case he specified the bench method for ten pieces or less.

An order for several hundred brackets was received in February 1933, indicating the circuit breaker was out of the experimental stage and necessitated a more economical method of manufacture. The simple die method was then added to the existing record card. It has been found a good practice to leave both methods on the card at this stage, for if the activity does not eventually build high enough

Table I—Ratio of Cost Elements to Bench Method

Method	*Die Cost*	*Labor Cost*	*Set-Up Allowance*	*Operating Allowance*
Bench	**0**	**1.00**	**1.00**	**1.00**
Simple Die	**0**	**0.96**	**3.26**	**0.107**
Interchangeable Shoe	**1.00**	**0.92**	**1.56**	**0.0198**
Compound Die	**1.87**	**0.89**	**1.30**	**0.0173**

to warrant special dies there will be times when orders for small quantities will be requested. If both methods are on record the Time Study Man does not have to recalculate for the bench method.

When a change is made from the bench method to the simple die method it is necessary to determine the correct quantity of pieces at which the one method should supersede the other. This is found by subtracting the allowed piece time for the simple die method from the allowed piece time for the bench method and dividing the remainder into the remainder found by subtracting the allowed set-up for the bench method from the allowed set-up for the simple die method. In algebraic form:

$$Q = \frac{\text{s.u.} - \text{S.U.}}{\text{R.T.} - \text{r.t.}}$$

Where

S.U. = total set-up allowed for the bench method

s.u. = total set-up allowed for the simple die method

R.T. = total running time allowed for the bench method

r.t. = total running time allowed for the simple die method

In the example given this is:

$$Q = \frac{3.35 - 0.75}{0.35640 - 0.03645}$$

$= 8.12$ or 8 pieces

At the same time an estimate is recorded of the quantity to be fabricated by the simple die method before a more efficient method need be considered.

This item was ordered in lots of several hundred pieces until, in October 1933, an order was received from the assembly section for 2,562 pieces. It was then considered advisable to construct dies of the interchangeable shoe type for the fabrication of this detail. When this method has been decided upon it supersedes the two previously used methods and a new quantity limit is estimated and recorded. This quantity indicates when the record card should be again reviewed by the Time Study Man. To find the correct quantity where the interchangeable shoe method supersedes the simple die method, the cost of the detail by the interchangeable method is subtracted from the cost of the simple die method and the remainder is divided into the cost of the dies to be made. In algebraic form, when:

A = cost to make dies for the interchangeable shoe method

B = total cost per piece recorded for the simple die method

C = total cost per piece by the interchangeable shoe method

Then, $\frac{A}{B - C}$ = dividing quantity between methods

For example: $\frac{155.00}{.10 - .025} = 2{,}066$ pieces.

The popularity of this circuit breaker kept production requirements expanding until orders being received were sufficient to stock larger quantities of the brackets. In July 1934 an order was placed for 15,000 pieces. At this time the Time Study Man changed the recorded method from the interchangeable shoe method to the compound method. The quantity where this method supersedes the interchangable die method is found in the same manner as above.

This system has given the Time Study Man a more complete control of methods, it has eliminated possibilities of active items being overlooked and has raised the efficiency of operation in our shop. This has been accomplished with a minimum of clerical routine. Time necessary for handling of paper work through the office has been materially reduced.

Pierce and cutoff operations are combined in this interchangeable die set-up. Female operators are used wherever possible

Table II—Comparison of Manufacturing Methods

Bracket – Style No. 256914-A

(3x2¼x$\frac{3}{32}$ in. Cold Rolled Sheet Steel)

Operation	*Set-Up Time Dec. Hours*	*Running Time Dec. Hours*
Bench Method – up to 8 pieces:		
1 – Shear to blank size	0.35	0.00130
2 – Make complete	0.75	0.35640
3 – Wash in No. 2954 solution	0.05	0.00040
Simple Die Method – from 9 to 2,066 pieces:		
1 – Shear to blank size	0.35	0.00130
2 – Slot, pierce and bend	3.10	0.02945
3 – Tap and burr	0.25	0.00700
4 – Wash in No. 2954 solution	0.05	0.00040
Interchangeable Shoe Method—up to 12,000 pieces:		
1 – Shear strips	0.29	0.00030
2 – Pierce, slot and blank	0.40	0.00100
3 – First bend	0.40	0.00160
4 – Second bend	0.40	0.00160
5 – Tap and burr	0.26	0.00225
6 – Wash in No. 2954 solution	0.05	0.00040
Compound Die Method – more than 13,500 pieces:		
1 – Shear strips	0.29	0.00030
2 – Pierce, slot and blank	0.30	0.00036
3 – First bend	0.30	0.00121
4 – Second bend	0.30	0.00146
5 – Tap and burr	0.26	0.00225
6 – Wash in No. 2954 solution	0.05	0.00040

Arbitration—
A Cost Saver

How to settle business disagreements without going to court about them

THOMAS J. WATSON
President,
International Business Machines Corporation

A SUDDEN explosion, a burst of hot oil, then fire, and the orderly work of an oil refinery becomes bedlam. When the fire has been extinguished the shop is closed for repairs, and the post-mortem, a week later, reveals appalling losses. Who is to pay these losses? The explosion was caused by the loosening of one of the parts of an intricate piece of machinery. The refinery claims that this was the result of a defect in mechanical construction and makes a claim upon the manufacturer for damages to cover its losses. The manufacturer disputes this claim, insisting that the accident was the result of negligence on the part of employees of the refinery in not checking and inspecting the machinery each day at the close of operation.

Both Litigants Lose

A lawsuit seems unavoidable, although both sides have much to lose by a public hearing of the dispute. The manufacturer, naturally, does not wish his widely known product to be publicly branded as defective and unreliable. On the other hand, the refinery, in order to prove the amount of its damages in court, would have to reveal publicly its operating costs, profits, and other trade secrets. Moreover, the many hours of valuable time that must be spent in the court room, the expense of lawyer's fees through the various stages of decisions, appeals, further decisions and further appeals and the tying up of the money involved for the duration of the proceedings, are equally dreaded by both sides; but there seems to be no alternative.

Then somebody suggests that they arbitrate the dispute. The parties have heard of arbitration in a vague way and have an idea that it is some kind of compromise settlement which they do not want. When told that it is not compromise, but is an adjudication of the dispute by men particularly qualified to judge the question, that the award will be final and enforced by the court, that there will be no publicity, and that by submitting the case to the American Arbitration Association it will be handled under standard rules with the administrative detail taken care of by the Association, arbitration appeals to both parties and they embark on a new adventure in cooperation.

The size of this dispute makes it advisable to have three arbitrators hear the case. Identical lists of men from the American Arbitration Association panel who would be particularly qualified to hear the dispute are submitted to each party by the Secretary of the Tribunal, from which lists the parties cross off any names they do not want and indicate their preference, if any, as to the rest. When the lists are returned to the Secretary, the Arbitration Committee appoints the arbitration board from the names remaining on both lists. In this case the arbitrators are: (1) a leading New York lawyer and former judge, (2) the head of one of the large New York utility companies, and (3) the Dean of the School of Engineering of one of the outstanding universities, thereby providing three kinds of expert knowledge: the legal, the practical and the theoretical.

There are three hearings at definite times set to suit the convenience of parties, counsel and arbitrators, and the lawyers for both sides present their cases with as much thoroughness as they would in court but without the interruptions on technicalities of procedure that break the continuity of a court-room presentation.

From the evidence submitted, the arbitrators decide that a proper periodic inspection of the machinery would have disclosed the loosening of the part responsible for the breakdown, inasmuch as it was not a sudden occurrence but a gradual working loose of a threaded part of the mechanism. Since the accident was therefore not the result of any defect in the machinery, the claim of the refinery is dismissed. This decision is entered in the Supreme Court of New York State as a judgment of that court and is enforced as such.

This is but one of thousands of cases that have been settled by Tribunals established by the American Arbitration Association throughout the United States and by the Inter-American Commercial Arbitration Commission throughout Latin America. Cases may involve a two million dollar dispute over fur concessions in Russia, or may involve a fifteen dollar dispute over storage charges of a New York warehouse. The method of handling the disputes is the same in each case and the results have been as satisfactory in one as in the other.

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Pistons and Rings

HIGHER railroad speeds call for lighter reciprocating parts. Instead of the old double wall type of cast iron piston we now have the thin web of Z section, either of cast or rolled steel. The use of the bull ring is also being questioned, as when riveted to the spider the weight is greater than with the one piece piston head.

The use of bronze piston rings is being discussed pro and con. There is complaint of rapid wear in some quarters with the attendant expense of removing the piston for replacement. On the other hand, some commend them highly because of decreased wear of the cylinder or cylinder lining. And when piston heads are built up to restore size after wearing too small, bronze welding rods are nearly always used. With our present knowledge of metals there must be bronzes that will show a wear life at least equal to cast iron. All these discussions show progress that will count in future operating efficiencies and costs.

Pitch Diameter Control *of Galvanized Bolts and Nuts*

H. W. BEARCE
Co-Chief, Division of Weights and Measures, National Bureau of Standards, U. S. Department of Commerce

Proper selection of threading tolerances will permit assembly of galvanized bolts and nuts with little or no re-threading

IT IS NOT uncommon to find that nuts have to be retapped or bolt threads recut after galvanizing before they will assemble satisfactorily. This is unsatisfactory to the manufacturer because of the added expense incurred; and to the user because of the probability that in the process of rethreading the galvanizing will be entirely removed from certain areas.

Galvanizing of bolts and nuts may be done by: (1) electro-galvanizing, (2) hot dipping, or (3) hot dipping and centrifuging. Thickness of zinc coating varies over wide limits—from a few ten-thousandths of an inch to 0.002 in. or more. Since, on a 60-deg. thread, the increase in pitch diameter is four times the thickness of coating added, it is clear that the increase in pitch diameter resulting from galvanizing may vary widely, from a few ten-thousandths to 0.008 in. or more. The character of fit between galvanized mating parts is very uncertain, unless the size of parts before galvanizing and the galvanizing process are both carefully controlled. Character of fit is, of course, also influenced by the degree to which the parts are free from scale, bubbles and excess spelter.

Consideration of a series of galvanized specimens recently submitted to the Navy Department, in connection with purchase specifications, raised a question in regard to the feasibility of threading bolts and nuts to National Screw Thread Commission tolerances for Class 1 fit, to such dimensions that they would assemble satisfactorily after galvanizing.

Publication Approved by the Director of the National Bureau of Standards of the U. S. Department of Commerce.

In this connection it was suggested that nuts be threaded to the high side, and bolts to the low side, of the N.S.T.C. Class 1 tolerances. Pitch diameter difference between nut and bolt would then probably be sufficient to insure assembly, after galvanizing, without retapping, recutting or rerolling.

As a result of this suggestion, a detailed study has been made of the pitch diameter differences between nuts and bolts, over the size range $\frac{1}{4}$ to 1 in., that would result from certain special applications of various classes of fit.

Pitch diameter differences that would result under certain conditions are shown in the accompanying chart. Dimensions given apply to the $\frac{1}{2}$ in.—13 thread. A similar chart could readily be drawn for any other size by reference to appropriate tables in the N.S.T.C. Report (Miscellaneous Publication No. 141, National Bureau of Standards).

Permissible Variations

By reference to the accompanying chart it will be seen that total permissible variation in pitch diameter of the $\frac{1}{2}$ in.—13, Class 1 nut is 0.0074 in. In the Class 1 fit an allowance is provided between the maximum screw and the minimum or basic nut and interference between bolt and nut will not occur unless the pitch diameter of the maximum Class 1 bolt is increased by the amount of the allowance, which on this size is 0.0022 in. That is, if the nut, after galvanizing, is not smaller than basic pitch diameter, and the bolt, after galvanizing, is not larger than basic pitch diameter, as indicated by correct "go" gages of basic size, the bolt and nut will assemble.

The question becomes, then, how can the permissible variation in pitch diameter of bolt and nut be most economically distributed between manufacturing tolerance and space left for galvanizing? Obviously, the more space used for the one, the less will remain for the other. A practical distribution would seem to be to use about one-half the permissible variation in pitch diameter for manufacturing tolerance and one-half for galvanizing.

From the chart it is seen that this distribution can be closely approximated by keeping the nuts, before galvanizing, between Class 3 and Class 1 maximum pitch diameter; and by keeping the bolts between Class 2 and Class 1 minimum pitch diameter.

Because of the Class 1 allowance, permissible variation in pitch diameter of the screw, without danger of interference with the minimum (basic) nut, is somewhat greater than is the case with the nut.

Actual figures for the $\frac{1}{2}$ in.—13 thread are as follows:

Manufacturing tolerance on pitch diameter of nut, Class 1 max.—Class 3 max.=0.0037 in.

Minimum space for galvanizing, Class 3 max.—basic p.d.=0.0037 in.

Total permissible variation in pitch diameter of nut=0.0074 in. Manufacturing tolerance on pitch diameter of bolt, Class 2 min.—Class 1 min.=0.0044 in.

Minimum space for galvanizing, Basic p.d.—Class 2 min. p.d.=0.0052 in.

Total permissible variation in pitch diameter of bolt=0.0096 in.

A similar analysis for the 1 in.—8 bolt and nut yields the following figures:

Pitch diameter of nut, Class 1 max.—Class 3 max.=0.0057 in.

Pitch diameter of nut, Class 3 max.—basic p.d. = 0.0054 in.

Total permissible variation in pitch diameter of nut=0.0111 in.

Pitch diameter of bolt, Class 2 min.—Class 1 min.=0.0069 in.

Basic p.d.—Class 2 p.d. = 0.0076 in.

Total permissible variation in pitch diameter of bolt=0.0145 in.

An obvious method of putting the above distribution into effect would

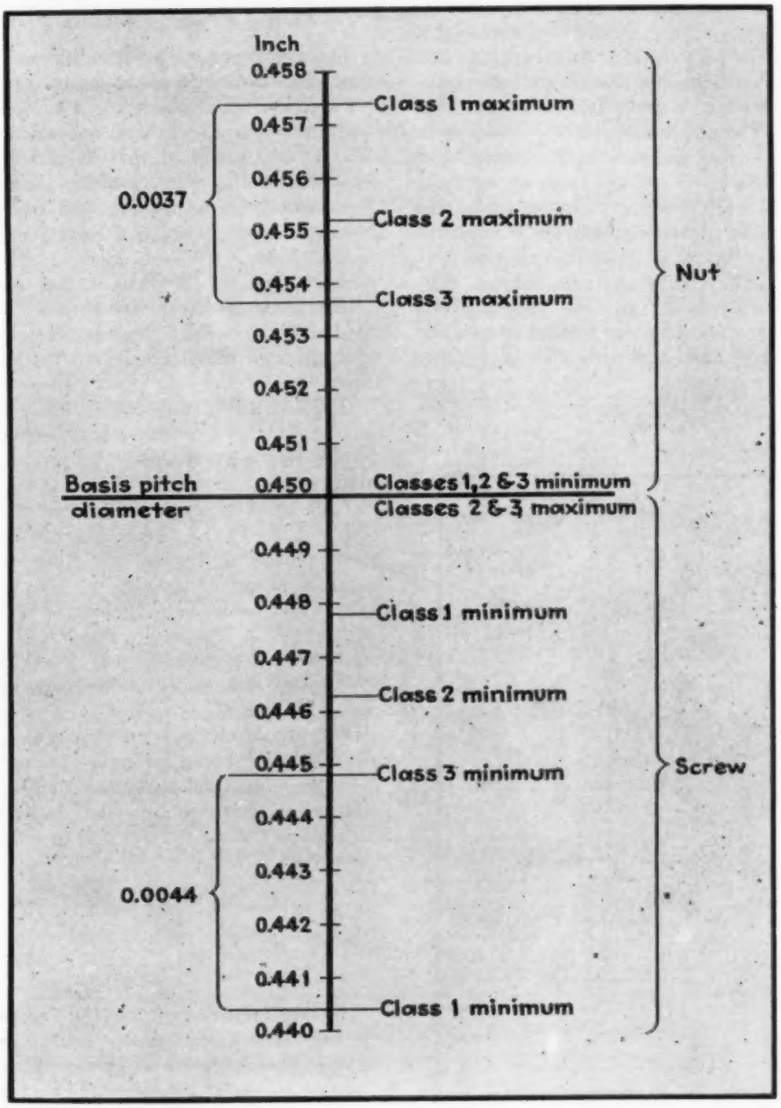
be to use a "go" plug gage made to the Class 3 "not go" limit, for inspecting the nuts as manufactured; and a "go" ring made to the Class 2 "not go" limit for inspecting bolts.

It may be found satisfactory to use the actual Class 3 "not go" plug as a "go" plug, and the Class 2 "not go" ring as a "go" ring; provided, of course, that the nuts and bolts, after galvanizing, are inspected with basic size "go" gages to insure assembly of the finished product. In this way the purchase of special size "go" gages, would be avoided.

Theoretically, the "go" gages made to the Class 2 and Class 3 "not go" limits, as outlined above for inspecting the threaded work before galvanizing, should be full form "go" gages having a length of at least one diameter of the work to be gaged. For recommended design, see the published report of the American Gage Design Committee, (CS 8-83, National Bureau of Standards).

In case nuts, which have been threaded and inspected as outlined above, fail to pass a basic "go" gage after galvanizing, retapping with a basic size tap should be permitted. If the nuts, before galzanizing, are passed by a "go" gage made to the Class 3 maximum limit, there should be plenty of galvanizing remaining in the nut after using a basic tap.

Analysis of standard tolerances indicates that machining nuts to between class 3 and class 1 maximum pitch diameter and screws between class 2 and class 1 minimum pitch diameter will permit galvanizing without interference between nut and screw



Heat-Treatment of Cast-Iron Parts

HEAT-TREATMENT is commonly practiced as a routine procedure for many automotive parts of cast-iron. This material is receptive to heat-treatment; it may be quenched, normalized, annealed and tempered. By quenching gray iron from temperatures above 1,500 F., hardness may be raised from 200 Brinell or less to over 500 Brinell. At lower quenching temperatures, the appearance of the fracture is changed but little, although hardness may be materially increased. At higher quenching temperatures, the characteristic silver-colored fracture may be obtained. Hardening may also be accomplished by means of air quenching. Localized hardening may be produced by rapidly heating the part to 1,750 to 1,850 F. and relying on the mass of the cool portion of the casting to dissipate the heat sufficiently fast to promote chilling or hardening.

Annealing is now common practice. Temperatures for annealing range from 900 to 1,400 F. Maximum softness is usually obtained at 1,400 F. At this temperature, the combined carbon is completely broken down to graphite. Any degree of softness above the minimum may be obtained by regulating the annealing temperature. Original hardness of the casting must be taken into consideration in annealing operations. All other conditions remaining constant, the higher the original hardness of the metal, the higher will be the final hardness after annealing. Chilled spots may be softened sufficiently to become machinable by heating to 1,700 to 1,800 F. for a half hour or more and cooling slowly to below 1,400 F. Annealing usually has a slight weakening effect on gray iron, but it is usually not more than two to ten per cent.

Quenching and tempering gray iron is quite feasible. Such treatment has been found to strengthen the iron and is probably the best practice to be followed in removing internal strains. The treatment is more effective in low carbon irons. Tempering temperatures usually range from 400 to 700 F.

Both hard and soft iron may exist in the same casting because of different rates of cooling in the various sections. This can be minimized by proper control of foundry and heat-treating practice.

Abstracted from a paper "Automotive Cast Iron," prepared by Harold S. Austin of Buick Motor Company for the Saginaw Valley Group of the American Society for Metals.

Safe Fixture
for Grinding Tubular Work

EDWARD GREENSPON

A CABLE and sheave suspension of a fixture used at a floorstand grinder can not be considered a safe practice. Yet it has been employed for holding tubular work while grinding off scale. What is the reason for the suspension? Is it so that the operator can transfer the unit to a bench nearby for loading and unloading?

If so, this cannot be considered an efficient production set-up. The operator should not be required to take any more steps than necessary. Best production in any work is obtained where the set-up is such that the operator can take a natural position while at work and hold that position throughout.

Stand for Fixture

Unless a stand or other support is provided during the loading or unloading process, the operator must hold the fixture to prevent turning or swaying while unclamping the work, removing the piece, inserting and clamping a new piece, then stepping up to the wheel for grinding. It is necessary that the operator step away from the wheel for loading and unloading, since otherwise he runs serious risk of an accident.

Two-Direction Frame

A better method is to mount the fixture on a swing frame attached either to the side of the machine, or on a base bolted to the floor. This frame is designed so that it can be swung or slid in both directions; to and from, and across the wheel face. Stops are to be attached to this mount, limiting its travel in any direction to a prescribed distance.

The advantages of this set-up over the cable and sheave arrangement are obvious. First, and most apparent, is that interference with the body and vision of the operator is eliminated. The operator takes a position "at ease." He is not required to "control" the set-up. He merely slides the work back and forth across the wheel face, and adds a little pressure if required.

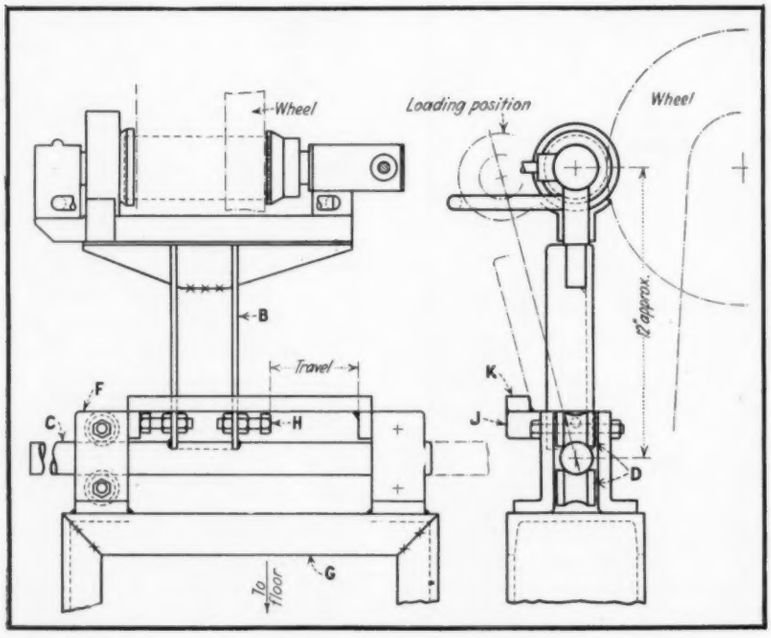
When loading and unloading, he does not change his position. The fixture is swung back from the wheel against a stop where it remains stationary while the work is unclamped, lifted out easily and conveniently and a fresh piece inserted and clamped ready to be swung to the wheel and ground. The sketch showing the converted set-up illustrates a reasonably good and inexpensive arrangement.

Swing-Frame Details

The fixture is inverted from its position when used with cable suspension. At *B* is a channel-iron upright to one end of which the fixture is welded. To the other end of this upright is welded the cross bar *C* which slides back and forth between the rollers *D* mounted in the brackets *F* so they revolve freely. These brackets are welded or otherwise fastened to the channel-iron table *G*. To the ends of table *G* are welded legs of similar channel-iron, which are bolted to the floor.

The adjustable stops *H* butt against the stop plates *J* welded across brackets *F* and control the travel of the fixture across the wheel face. The rectangular bar *K*, extending across the front of the fixture and welded to the stop plates, serves as the support against which the upright is swung to rest while loading and unloading the fixture.

Since the operation is only to grind off scale, and the grinding can be done by eye, no provision to control the depth of cut is considered necessary. This set-up will clip 15 per cent or more from operating time of the other arrangement and it is evident that the safety factor is greatly improved.



A fixture mounted on a swing frame is not only a safe device, but also a more productive one for grinding tubular pieces at a floorstand grinder

Ideas from Practical Men

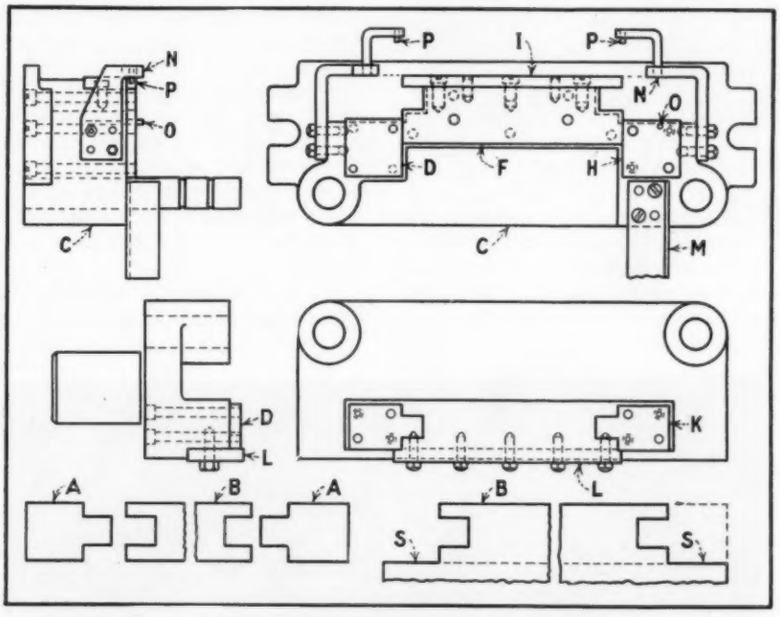
Press Tools for Blanking and Shearing

GEORGE WILSON

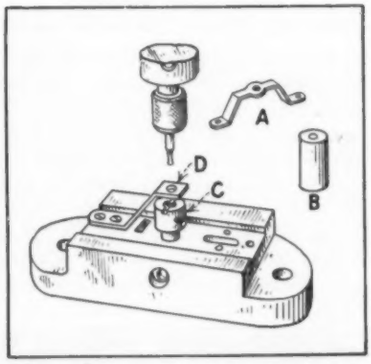
In the illustration are shown the combined blanking and shearing tools for producing the two short pieces *A* and the long piece *B* that go to make a hinged strap which is one of two units that constitute replacement battery carriers for automobiles. It was decided to use stock wide enough to permit punching out the three pieces across a 10½-in. sheet. By so doing we took advantage of the difference in cost between strip and sheet.

Mounted on the die-shoe *C* are the hardened pieces *D*, *F*, *H* and *I*, of which *I* is the lower shear blade. Punches *K* and the upper shear blade comprise the upper unit. The stock is squared and guided by the angle iron *M*, the end contacting stops *N*. When the stock becomes too short to be guided by the angle iron, it is guided by the pin *O*. Pins *P* hold up the last end of the stock on the lower shear blade, otherwise it would fall down.

In operation, with the end of the stock in contact with the stops, the two short pieces *A* are blanked by punches *K* on the first descent of the ram, leaving the long piece *B* projecting from the stock. The stock is then advanced until the shoulders *S* contact stops *N*, and on the next descent of the ram piece *B* is sheared off and two other short pieces *A* are blanked, thus the three pieces are produced at each descent of the ram after the first.



Two pieces are blanked and one piece is sheared in these combination tools. The three pieces are produced at each stroke of the ram after the first



Old punches held in drill chucks and used in connection with parts salvaged from obsolete press tools are an aid in miscellaneous and experimental jobs

Drill Chuck Holds Small Punches

CHARLES H. WILLEY
Superintendent of Manufacturing, Hoyt Electrical Instrument Works

A drill chuck used to hold small punches in the presses has proved to be practicable for many miscellaneous jobs in our plant. The chuck is mounted in a shank to fit the ram of one of our small presses and permits the use of old punches salvaged from obsolete press tools. It is the practice in our shop to disassemble all obsolete press tools and to keep the parts for quick use on temporary or experimental jobs.

As an example, the die-shoe from an obsolete set of tools was used for repiercing the central holes in the stampings *A*. As originally pierced, the holes were the size of a No. 53 drill, but a change in design called for the holes to be $\frac{7}{32}$ in. To proceed with production it was necessary to repierce the holes in the stock on hand without delay. A rather short $\frac{7}{32}$-in. punch was held in a drill chuck. The die or bushing *B* was mounted in the quickly made nest *C* and the simple stripper *D* was attached to the die-shoe, as shown in the illustration.

We have two or three drill chucks

that have been salvaged from worn-out breast or portable drills, the grip of which is sufficient to hold punches for thin material from pulling out on the upstroke of the ram, but for moderately heavy work, key-operated chucks are better.

Indexing Jig Without an Index Pin

CHARLES C. TOMNEY
Chief Tool Designer, Carrier Corporation

In the illustration is shown an indexing jig for drilling the suction and discharge ports on both sides of a cylinder block, one of the features being that it requires no index pin.

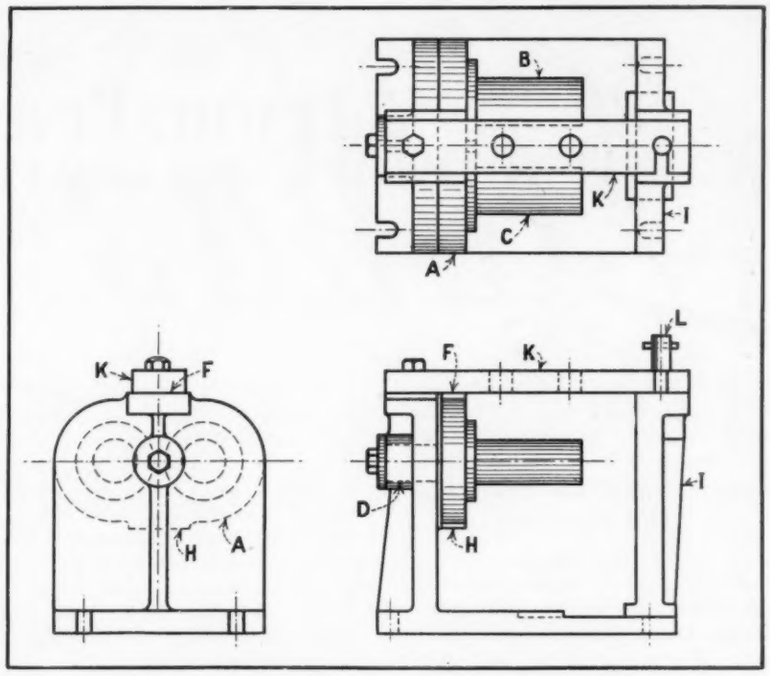
The work holder *A* has two plugs *B* and *C* that engage the cylinder bores. It also has a bearing at *D* on which it can be revolved. Flats *F* and *H* are planed on opposite sides

Flats F and H locate the work accurately in successive positions

of the holder flush with the top of the jig. The end support *I* is removable and is bored to receive the skirt or spigot ends of the cylinders.

In operation, the pivoted bushing plate *K* is swung out of the way, the end support is removed and the cylinder block is placed on the holder, plugs *B* and *C* engaging the cylinder bores. The work holder and the work are then revolved so that the flat *F* on the holder is fair with the top of the jig. The end support is replaced and the bushing plate is swung back into position and is locked by the thumbscrew *L*, the pivoted end of the bushing plate bearing on the flat *F* on the holder and positioning it and the work.

To index the cylinder block for drilling the ports in the opposite side, the bushing plate is unlocked and is swung out of the way, the end support is removed and the work holder and the work are revolved to bring the flat *H* on the holder fair with the top of the jig. The end support is then replaced and the bushing plate is swung back into position and locked by the thumbscrew. Locking the bushing plate causes its pivoted end to bear on the flat *H* on the work holder and index the work.



Locking the bushing plate causes its pivoted end to bear on one of the flats on the work holder, indexing the work and locking it in position

Handling Long Stock in the Turret Lathe

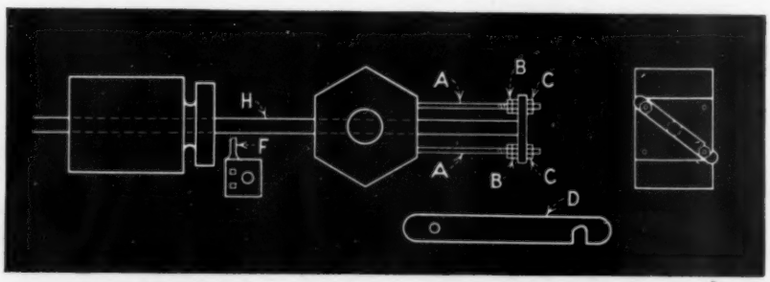
SAM MOSKOWITZ
General Electric Company, Philadelphia Plant

In cutting off stock too long for a stop on the inner face of the turret to be used, and where much time had been wasted in measuring the length of the piece to be cut off with a long flexible scale passed through the turret, the method illustrated was finally employed.

Two ½-in. studs *A*, 8 in. long, were each threaded on one end to fit tapped holes in the rear face of the turret, the opposite ends being threaded for the locknuts *B* and the adjusting nuts *C* to hold the stop plate *D* in position.

The first end of the stock is chamfered by the combined cutting-off and chamfering tool *F*, which is held in the turret toolpost in the cross-slide of the carriage. After chamfering the first end, the stock is fed through the turret and against the stop plate *D* and the piece *H* is cut off, after which the tool is fed in farther, chamfering the end of the next piece to be cut off.

There is nothing to interfere with the passage of the stock through the



Stock too long for the ordinary turret stop to be used is fed through the turret and against an adjustable stop on its rear face

turret since the locking stud in its center has a clearance hole large enough for the stock to pass through it. The stop plate *D* is in the form of a latch and can be swung out of the way to permit the piece cut off to be withdrawn through the turret.

Planer Fixture Swivels to Machine an Arc

J. R. WHITTLES

Replying to Carl Hoffman's criticism (*AM*—Vol. 81, page 252) of the fixture described by me in an article under the above title (*AM*—Vol. 80, page 1053), I will say that both the gib *F* and the plate *A* are attached to the planer table.

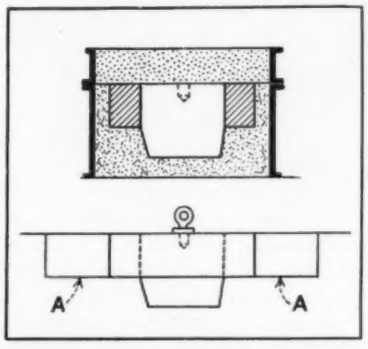
Bracket *D* and pin *C* are stationary. The drive pin *K*, which is attached to plate *A* will cause plate *B* to travel in a circular path, while plate *A* and gib *F* will travel in a straight line with the planer table. Therefore the fixture will operate as described in my original article.

Oversize Nut Shrunk to Fit

JAMES McINTOSH

Reading the article by H. F. Misener under the above title (*AM*—Vol. 81, page 292) reminded me of the following incident:

A collar having a bore of 14 in. and a thickness of 6 in. was to be made in a foundry where chilled rolls were cast. One of the wise boys said that the collar could be cast on a chill,



Molten iron poured into segment molds gave enough quick heat to cause the collar to give up its grip on the chill

leaving the wall of the hole hard, smooth and to size, eliminating boring.

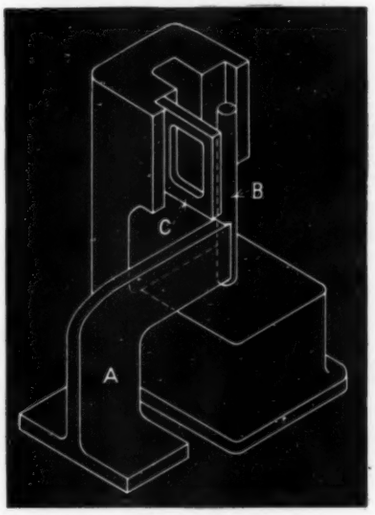
A chill was made and drilled and tapped for an eyebolt so that it could be lifted by the crane and entered into the mold. When cast, the collar was found to be shrunk so tightly on the chill that even blows from the skull cracker failed to remove it.

One solution offered was to bore out the chill, but the problem was finally solved in another way. The collar and the chill were buried in the sand and the outside of the collar was surrounded by segment molds, as at *A*. The crane hook was hitched to the eyebolt and molten iron was poured around the segments. The sharp heat transmitted through the segments expanded the collar from the outside so that the chill being relieved from the shrinkage strain was lifted out of the collar by the crane

Gage for Planing

FRANK C. HUDSON

A planer job recently seen was the setting of a large press frame so as to plane the bed at right angles to



the slide which guides the ram. This is no job for a beginner as the quantity required would never warrant the making of a fixture to hold the bed.

To set the slides in a vertical position the gage *A* was made with the ground shaft *B* fastened at right angles to the base, in both directions. The piece *C* is of cast iron planed square on both sides and on all the outer edges. This is clamped to the slides so as to extend the surfaces over the bed where they can be easily measured.

The bed to be planed is adjusted on the planer bed by steel wedges until the piece *C* lines up with the bar *B* in both directions. Either paper or a steel feeler is used in adjusting the bed until proper alignment is secured. When the piece *C* and shaft *B* show that the alignment is correct the bed is clamped and the bed planed. Similar gages can be used in other work.

Punches and Dies for Cutting Templets

C. G. WILLIAMS

L. S. Taylor makes the statement (*AM*—Vol. 81, page 413) that round and irregular openings and slots in templets are inaccessible to the bandsaw.

There is no hole or slot in a sheet-metal templet that is inaccessible to the bandsaw of today. By the use of a small electric appliance that is now a part of the equipment of modern bandsaws, it is but the work of a couple of minutes to open the saw by melting the solder at the joint, thread one end of the saw through a hole in the templet, and resolder the joint. The operation may have to be performed six or seven times in the course of an hour, but it will enable work to be done that would otherwise require several hours by any other method.

Successive punching or nibbling will leave innumerable points that must be chipped and filed to smooth the edges, and how many mechanics of today can chip and file in a straight line? Such operations are now among the fine arts and are done only by the gray heads in the shop. Sawing the metal leaves an edge that requires but a few strokes of the file to smooth it.

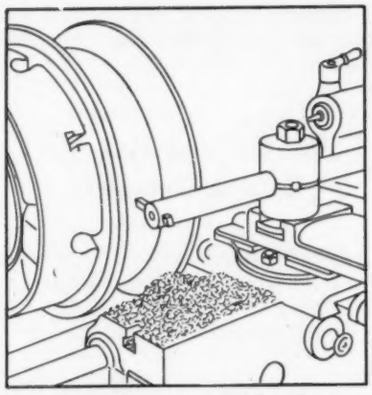
Repairing Drag-Line Pulleys

CHARLES F. HENRY

Phosphate mining in Florida is a drag-line operation, scooping the earth from the top and then digging out the phosphate with large drag-buckets. Constant action of the wire cables on the pulleys that guide them wears the pulleys quite rapidly. These pulleys are rebuilt by turning their face and welding in a steel reinforcement.

The illustration shows the turning of one of the pulleys or sheaves, to remove metal enough to secure a flat surface to support the reinforcement. The size of the lathe used makes it necessary to employ what is virtually a boring tool in order to reach over the pulley flange, as can be seen.

The reinforcement consists of boiler plate, or other plate, steel made in two parts and rolled to the proper



A flat surface is turned, using a boring tool because of lathe limitations, so that semi-circular pieces can be welded in place

radius to fit the turned surface of the pulley. These halves are then welded into place and form an entirely new wearing surface for the cables. This is from the shop of The Southern Phosphate Corp. at Barstow, Fla.

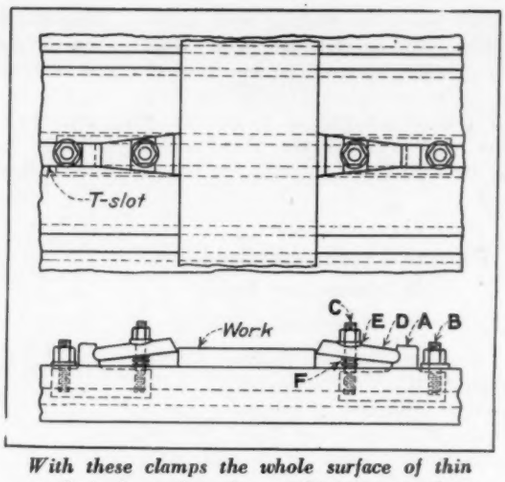
Boring Fixtures for Holes at Various Centers

IRA S. WILLIAMS

Many small lots of cranks and levers had to be made with the holes accurately bored and aligned and with the center distances maintained. For this work a fixture was designed for use in the drill press.

The auxiliary plate *A* is made fast to the drill press table with a locating pin *B* in alignment with the drill press spindle. Fixture base *C* has two holes *D* accurately bored at the proper center distance for the piece in hand.

The work is held in V's, one of which is adjustable and backed up by a setscrew *F*. In operation, one of the holes *D* is placed over the pin *B* and then one of the holes in the piece is bored. In the second step, the second of the two holes *D* is put over pin *B* and the other hole in the work is bored. This procedure establishes the correct center distance for the bored holes. These are produced with a stub bar containing a single tool. Clearance holes for the bar were previously drilled from a layout.



With these clamps the whole surface of thin work is kept clear for machining operations

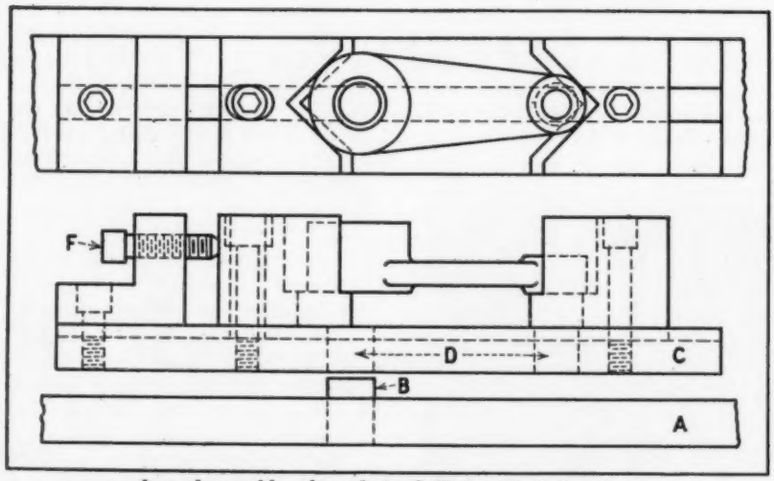
Machine Clamps for Thin Work

F. DOUGHTY
Shipley, Yorkshire, England

Having a quantity of small, thin slides and platens to machine all over, several holding clamps like those shown in the accompanying sketch were made up from materials available in the shop. Design of the clamps is such that a wedging action is secured between the clamp bars and the sides of the work. The entire top surface of the work piece can be left free for machining operations.

Small steel blocks, *A*, are machined to fit the table T-slots and are fitted with studs *B* and *C*. One face of the extension at the top of the clamp block *A* is machined to mate with the rounded end of clamp bar *D*. The opposite end of the clamp bar is beveled to provide a better grip on the work than is possible if the end is left square. Clamp bars are made wider at the work end than at the fulcrum end, as shown.

Clamp bar *D* is machined to provide a seat for radius washer *E*, which permits tightening the nut on stud *C* without bending the stud. These clamp units are suitable for almost all types of small and medium size work requiring faceplate or machine-table operations in which the top surface must be kept clear. Clamps of this type are frequently valuable for holding small tool parts on dividing-head faceplates and jig-borer tables.



Interchangeable plate C is drilled with holes D at the correct center distance for the work in hand

Freak Magnetic Action

ANDREW J. SCHWARTZ

H. R. Hageman makes the statement (*AM*—Vol. 81, page 411), that a bushing would not stay in place in a die block when the current was on the magnetic chuck. At the bottom of the article the author asks, "Can any reader explain why the bushing should have popped up instead of being held down by the magnetic flow?"

It appears to me from Mr. Hageman's description that the action of the bushing in the die-block was very similar to that of an armature in a solenoid. The die-block becoming magnetized creates a field of magnetic force and consequently the bushing, acting as an armature, would move up, thereby closing the air gap between the shoulder on the bushing and the counterbore in the die-block and tend to equalize the lines of force in the assembly. There were more lines of magnetic force created in the die-block than in the bushing (armature), hence the bushing would not stay down when the current was on in the chuck coils.

Centralization of Work

in Drilling Jigs

XIII — Many of these principles can also be applied to milling and assembly fixtures

C. W. HINMAN
Kobzy Tool & Electric Manufacturing Company

SOMETIMES a vexing problem is to design quick-acting devices for properly centralizing and rigidly holding rough castings or forgings in jigs for drilling. It often occurs that several methods present a practical appeal, until we recall from experience that only one of them is best. The right design can only be arrived at by carefully analyzing the conditions to be covered in every case.

Good designing requires ability to visualize a correct picture of all the details in drilling a piece of work, from floor to floor. It requires thorough comprehension of all the conditions in loading and closing the jig, centralizing and securing the work, placing the tool against the stops on the machine table, drilling, and using a lubricant when necessary, provision for chips, and finally opening the tool, removing the work, and cleaning the jig in readiness to repeat the cycle.

In Fig. 102 is shown a simple method for clamping and centralizing a rough cast box, equally on each side of its center-line, for either drilling or milling. The two circular side-faced cams, *A*, serve two purposes, namely: to hold down and to centralize the work piece. The cams are close fitted at surfaces *B*. If the work is very long, two of these centralizing units are employed, one near each end of the work. An advantage in using this design is that it does not clamp hard enough to distort frail work. For this reason it is best to employ additional clamps at both ends of the piece for holding the work down on its registering face.

Fig. 103 represents a principle in which the screw bushing *A* is relieved for centralizing round rough work by an interior angle of 90 deg. in its clamping end. It is generally used in centralizing the drilling of holes in round cast or forged hubs, bosses, and similar projections on the work.

When the jig leaf is opened, it rests against the angular stop *B*. This prevents the leaf from swinging too far, causing lost time in opening and closing it. The work is approximately located on the floor of the jig,

Fig. 102—Two side-faced cams *A* centralize a rough cast box, but will not distort frail work

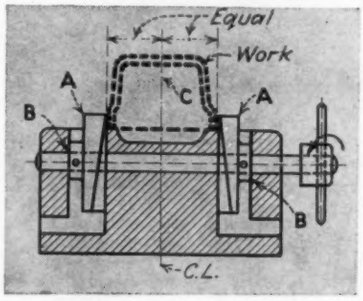
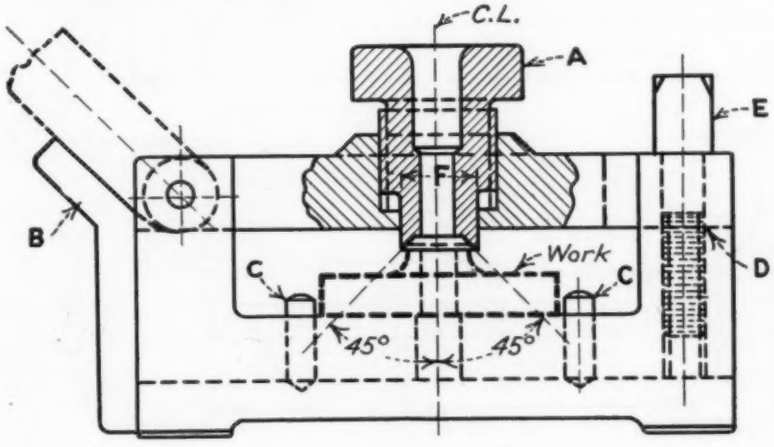
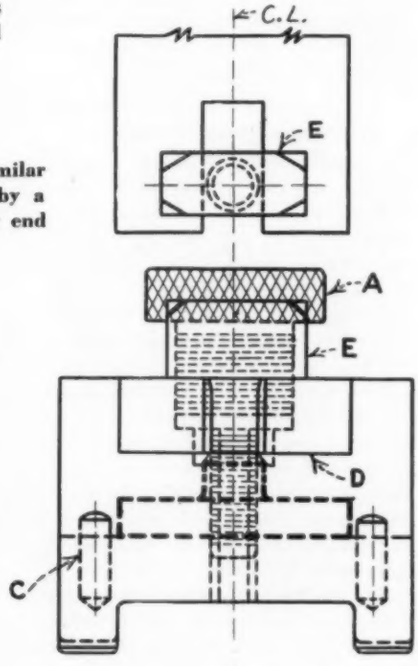


Fig. 103—Round hubs, bosses or similar projections are readily centralized by a screw bushing relieved on clamping end





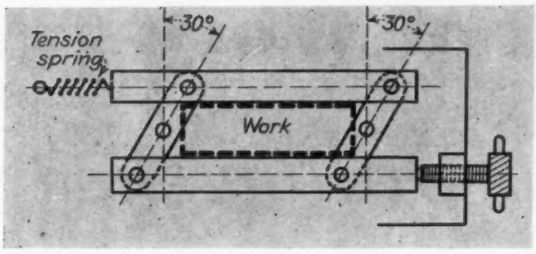


Fig. 104 — When the screw is turned in, the parallogram linkage is closed to grip and centralize the work

Fig. 105—Jaw *B* closes an equal distance as jaw *A* is pushed in by the screw, hence providing positive centralization of the work

between the four clearance pins *C*. The leaf is then closed against stop *D*, and is secured by a quarter turn of wing *E*. This fastening is one not previously shown. It is easy to make, is quick and effective in operation, and is widely used.

The screw bushing is guided in the leaf by its diameter *F*, which is turned down and relieved of threads for this purpose. When the bushing is screwed down, its interior angle clamps around and centralizes the round work to a central position directly under the bushing hole. Of course the edges of round rough work are sometimes lopsided or oval shape, but it is not the fault of this principle if it fails to give a good average in centralizing results.

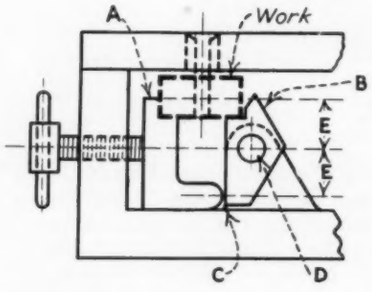
In this jig design we have the peculiar condition in which drilling through the leaf is more accurate than drilling through the jig body. This is because the work is located by the drilling bushing which is also in the leaf. The jig body merely provides a good drilling support against the drilling thrusts. It is noted again that the body reinforcing ribs are underneath the jig. This provides for easily cleaning chips and oil from the jig floor.

Centralizing Clamps

A parallelogram of bars is used for holding and centralizing work pieces having parallel sides and variations in width. In Fig. 104, the screw is advanced and closes the bars by action of the two parallel links. A tension spring opens the bars when the screw is receded. This principle, slightly modified, is one method for centralizing a stock strip while feeding it through a blanking die.

Right- and left-hand screw threads mounted in opposite jaws, and similar in use and principle to roller-skate toe clamps, are sometimes used for holding and centralizing work pieces in jigs and fixtures.

In Fig. 105 is a design that accomplishes the same result as the roller-skate clamp, and uses only one right-handed thread. The right-angled jaw

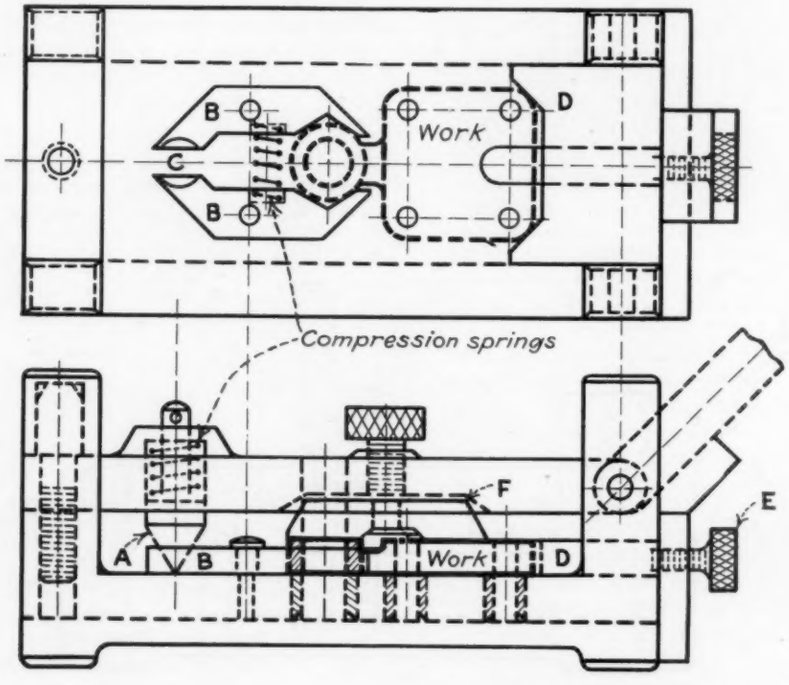


A slides forward with the screw advanced behind it, and contacts the rocker arm *B* at point *C*. The rocker arm is the important factor in this design. It is pivoted on fulcrum pin *D*, which lies midway between points *A* and *C*, as represented by the equal dimensions *E*—*E*. By construction it is evident that if jaw *A* is advanced a certain distance, jaw *B* will likewise be advanced the same distance toward *A*, hence these jaws approach each other, on the work, in positive centralization. A spring, not shown, opens the jaws when the screw is receded.

Automatic Closing

In another centralizing design, Fig. 106, the jaws are made to open and close on the work automatically. In operation, when the leaf is closed it carries within it the conical point *A*, with a compression spring behind it. Point *A* enters between the centralizing arms *B*—*B*, at *C*, and by equally spreading the arms it thus closes the jaws and centralizes the round boss on the work between them. As closing of the leaf continues, the jaws lock tighter, because the spring is further compressed. Finally the leaf is positively stopped and locked in the jig body, with the cone at its maximum spring compression. If the included angle of the cone is 25–35 deg., the work will be positively secured for practical purposes. The rear work centralizing jaw *D* is then advanced by screw *E*. Equalizer *F*, in the leaf, is tightened against the work to provide a positive support against the drilling thrust. The leaf is omitted

Fig. 106—Closing the leaf causes conical point *A* automatically to spread centralizing arms on the round boss of the work. Two equalizers are then operated by screws



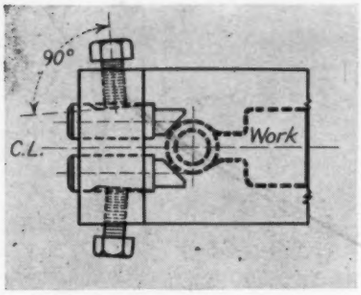


Fig. 107 — Separate pins with V's milled on them can be independently adjusted when different lots of parts vary in size

in the upper view to show the plan views of the centralizers.

Fig. 107 shows a principle in which an easy adjustment of the centralizing V's is accomplished. It is used for centralizing rough castings or forgings, for drilling or milling, that vary considerably in sizes in different consignments. Therefore an imperative necessity arises where the V locations must be altered. The V's are milled on separate pins, and then hardened, ground and faces lapped. The pins can be independently adjusted and locked. With this device the work can be made to locate coincident with the centerline, or either side of it, if necessary. Note that the locking screws are set at right angles to the pin flats, giving the most efficient setscrew position in a case of this kind, and one which is not likely to disturb the pin adjustment when tightening the screws.

A hinged-jaw design for a centering V is represented by Fig. 108. This type is much used because it is simple, effective and easy to make. A

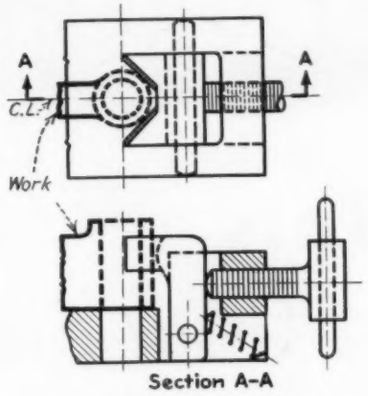
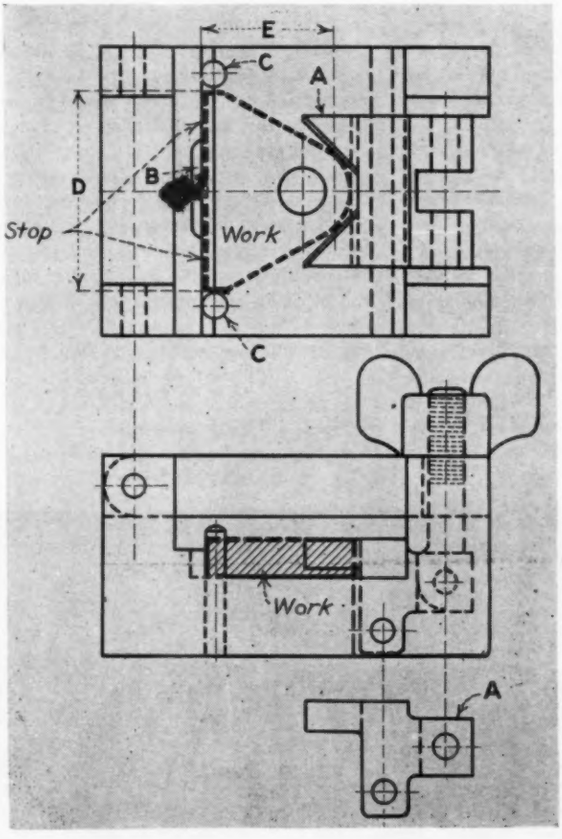


Fig. 108 — A hinged V-block with convex jaws is an effective centralizing and clamping device



tension spring withdraws the V jaw from the work when the screw is backed away. The inner faces of the angular jaws have convex cross-sections in contack with the work. This compensates for the radial travel of the jaws on the work, because the jaw swings on a fulcrum pin. Centralizing V-blocks should be hardened and ground, and the interior angles lapped at the points in contact with the work. This insures easy sliding action of the work within them, so

Fig. 109 — A bellcrank operates the V-jaw to line up and clamp the work against a stop when the wing nut is tightened

necessary in lining up and clamping the piece properly.

A rather unusual but practical principle can sometimes be used as illustrated in Fig. 109, for simultaneously clamping and centralizing the work. The jig leaf is omitted in the upper view for clarity. By employing the "bellcrank" principle in designing V-jaw *A*, in which the draw-bolt and wing-nut is attached, the V is forced to line up and clamp the work against the stop, when the wing-nut is tightened on the leaf. This idea is sometimes used without the V jaws; just a plain-faced clamp for registering the work when closing the leaf and tightening the nut.

Foresight Needed

However, in this design there are difficulties present. There should be a relief in the stop at point *B*, and approximate locating pins at *C*, for the work. Care should be used in regard to the size and shape of the work. For example: If dimension *D* on the work, is less than dimension *E*, the clamp, when advanced, is very likely to fail in centralizing, and to deceive the operator by clamping the work awry.

This raises the old question, so well known by all designers engaged in this work. Is the tightening clamp too far from the opposite stop for perfectly aligning narrow work, when the screw is "tightened home?" If in doubt, it is best to try the given conditions with an improvised stop on a surface plate in the shop, before using the design in a tool. Never allow a design to get ahead of you, hold it well in hand. Foresight is the key-note in engineering, and is a far more valuable asset than to always be in the wake of a design.

Part XIV of Mr. Hinman's series on tool design will appear an early number.

Kinks did it — Why?

FRANK C. HUDSON

Discussion as to removing frozen milling machine arbors from their spindles has included many methods. That by N. V. Smith (A.M. Vol. 81—page 588) is simple, sane and interesting. I do not recall seeing the old railroad shop method, used for getting piston rods out of old pistons, mentioned. This was simply shooting them out with gunpowder, exploded in a small cannon with a bar that rested against the small projection end of the rod. Everyone stood clear when the gun was fired. These were truly "self-holding tapers."

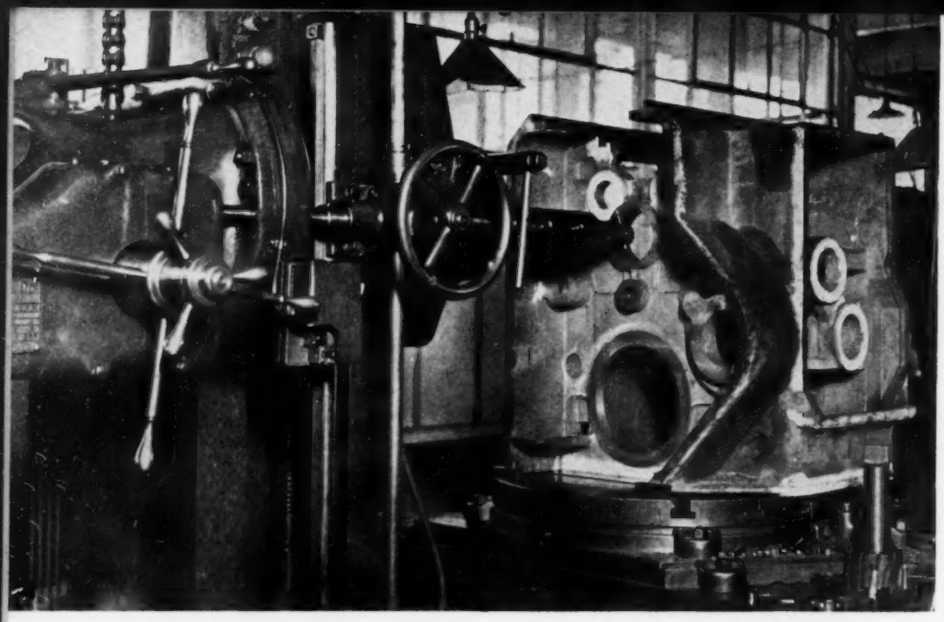


Fig. 1 — Boring large automatic screw machine head on Lucas machine

Good Points *About Single Points*

TOOLMAKERS and others whose work requires precision have always been partial to single point tools for producing internal and external cylindrical surfaces. That single point boring has long been a standard operation where accurate holes are required is indicated by the number of offset boring heads in use. In the same way single point turning is preferred to hollow milling. With a single point tool both inside and outside surfaces are generated rather than depending on any semblance to a form.

Boring machines, especially those of the modern horizontal type have long been used for single point work, both in the tool room for fixture work, and in the machine shop where the quantity to be made does not warrant the making of fixtures and boring bars. In some work of this kind, however, special boring bars, or boring heads supplement the use of the single point tools. Then, too, there are times when the boring machine acts as a miller to machine surfaces which can best be finished while the work is in position for boring. By so doing we secure alignment and save one or more handling of the work.

An excellent example of this kind of work, Figs. 1, 2 and 3, is a head stock casting of an automatic screw machine. The work is mounted on a rotary table provided with an index and lock bolt for holding it in 90 deg. positions. Fig. 1 shows the variety of sizes of holes being bored and the use of a single point tool in the short boring bar. The bosses surrounding these holes are faced at the time they are bored to insure squareness with the bore. In Fig. 2 the machine is being used to mill the flange of the large opening, which includes the side milling of the lower side of the opening. Another milling job is being done in Fig. 3, using only the end of the milling cutter. Both of these milling jobs utilize the vertical movement of the head and the cross feed of the table.

Vertical jig borers can also handle a variety of work of a somewhat similar nature. Figs. 4 and 5 show a magnesium casting for airplane engine work. The first shows the completed piece and the latter the way in which it is held while being surface milled. There is also a lot of boring on this piece, all done with single point tools.

A somewhat unusual job in seen in Fig. 6 in which a sweep cutter, but nevertheless a single-point tool, is be-

Fig. 2 — Head indexed 90 deg. to mill flange of side opening

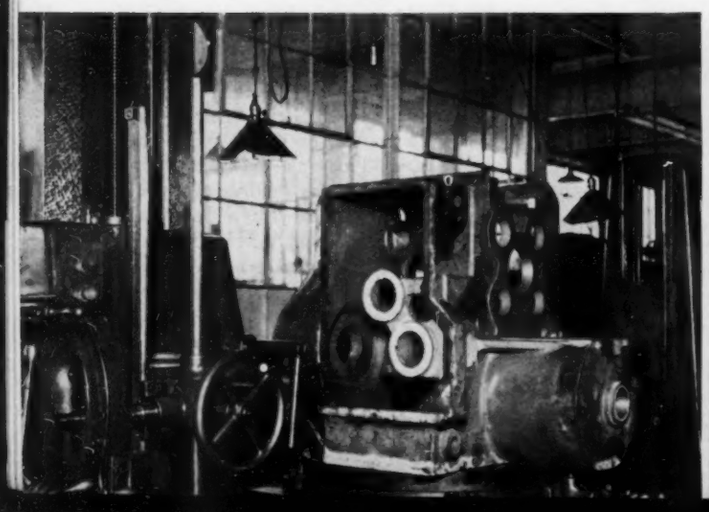
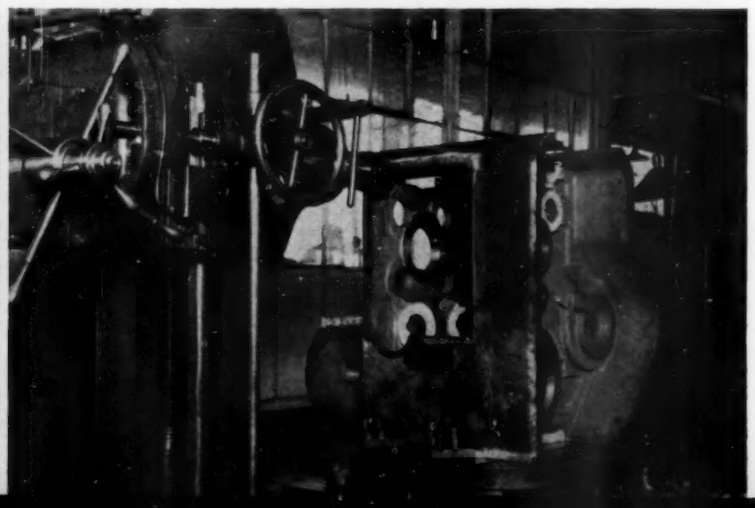


Fig. 3—Milling opposite side of the same head by further indexing of table



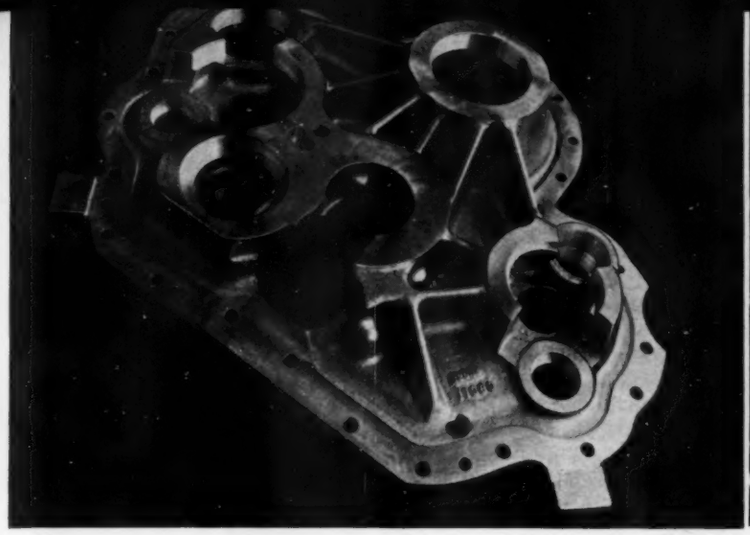


Fig. 4—Magnesium casting for airplane engine machined complete on Pratt & Whitney jig borer

Fig. 5—Machine set up for boring and milling the same casting

ing used. The tool is held in an offset head with micrometer adjustment. Both holes and all the surfaces are cut with single-point tools and the correct center distance is secured by the use of the regular gage blocks used in jib borer work.

Another single-point job, using a small cutter in an offset head, is seen in Fig. 7. Here again the holes are located by gage blocks.

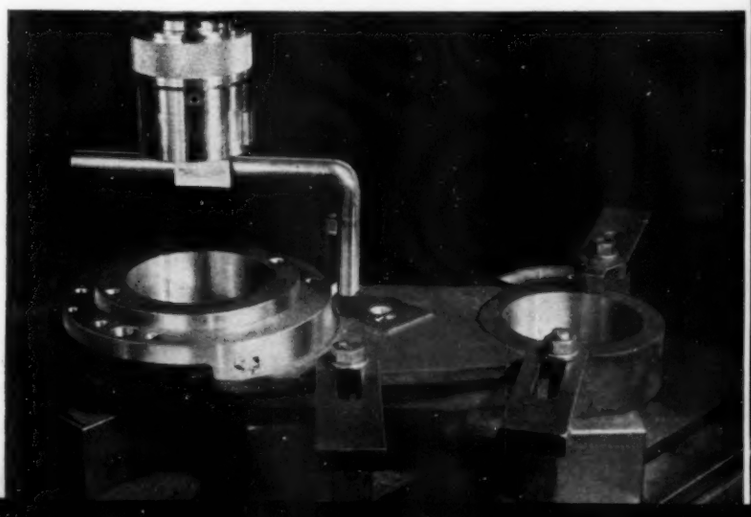
An unusual use of the jig borer is shown in Fig. 8 where a four station, indexing mechanism is being assembled by means of the jig boring methods. The four units have been previously machined and made into sub-assemblies. These are then mounted on the base and located by using the sensitive indicator in the machine spindle. With the table table properly set, one or more parts of each unit are checked by the indicator shown. When correctly positioned the unit is clamped, drilled and doweled in position. This was repeated for each of the four units. In this way the mechanisms were located without appreciable error and in much less time than previously.

The so-called diamond boring machines, in which diamonds have been largely replaced by carbide-tipped tools, were originally designed for small work made in large quantities. Its success in these fields have led to an appreciation of its possibilities on larger work and in small quantities. Beginning with experiments by the builders of such large machines, the results led to its adoption as a standard method of manufacture even in comparatively small lots. The high cutting speeds made possible by carbide tools and the accuracy readily obtainable by single point tools in rigid machines have proved economical as well as producing a better product. Builders of high grade machine tools are naturally keenly interested in machines and methods that will improve quality. When this can be done at a lower cost the method becomes doubly interesting.

The illustrations that follow show a few of the applications of the new method to parts of machines that go to make up the master tools of industry. They are from the shop of the Heald Machine Company and show how they use the Bore-Matic machine on their own products. The line cuts in Fig. 9 show the general dimensions of the bored portions, some of which are much larger than have been handled on machines of this type in the past. Bored surfaces are shown by heavy black lines. Here the tolerances for roundness and straightness range from 0.0001 to 0.0002 inch, while the over-all tolerances vary from 0.0002 to 0.0005 inch. Such accuracy seems to be secured and

Fig. 7 — Boring and locating small holes in a large casting

Fig. 6 — Turning outside of boss with sweep cutter held in micrometer adjusted offset head



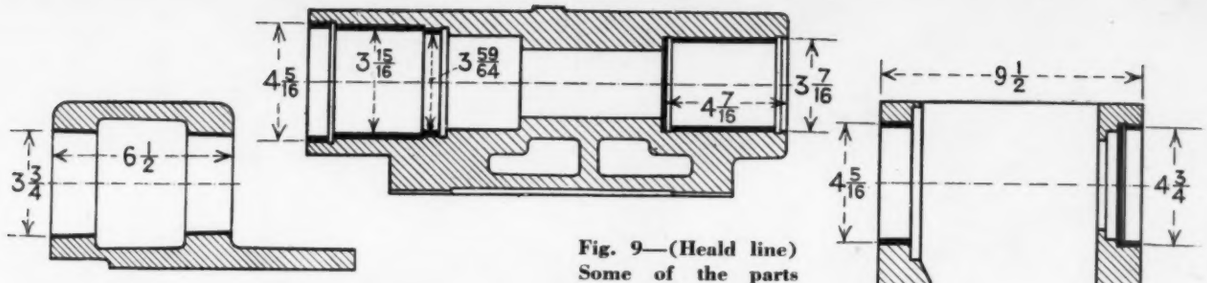
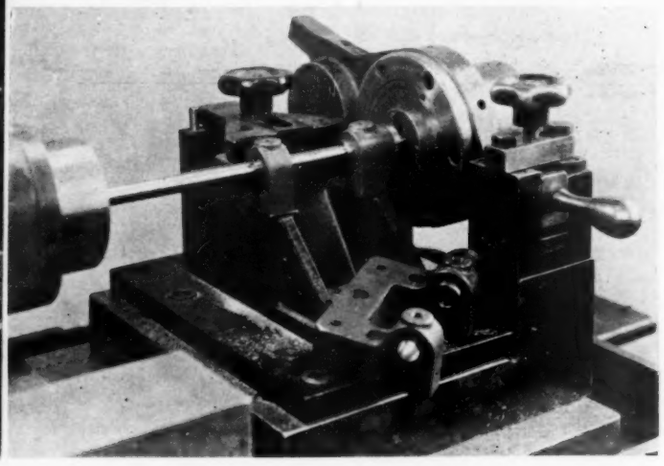


Fig. 9—(Heald line) Some of the parts bored. Heavy lines show bored surfaces

Fig. 8 — Using jig borer to locate units on an indexing mechanism bedplate so as to insure correct assembly

Fig. 10 — In boring this valve body the outer end of boring bar is supported in a substantial housing



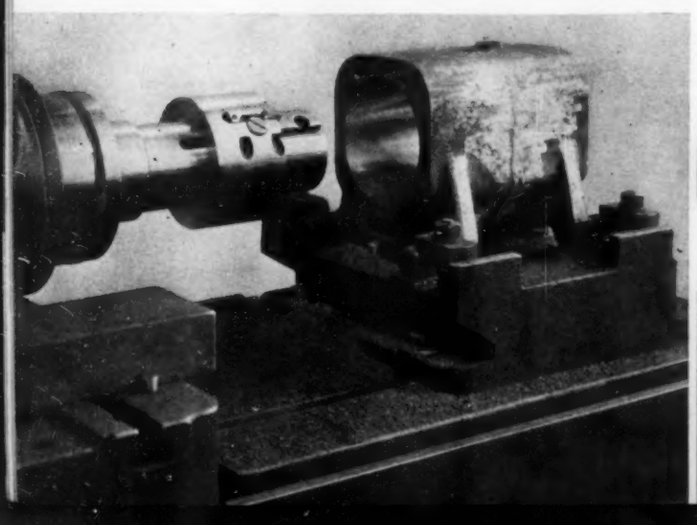
maintained more easily by this method than any other. No trouble has been found in maintaining these tolerances and in lots of 25 to 50 pieces it has shown a substantial reduction in shop cost. In fact the average saving on 22 different pieces was a trifle over 80 per cent.

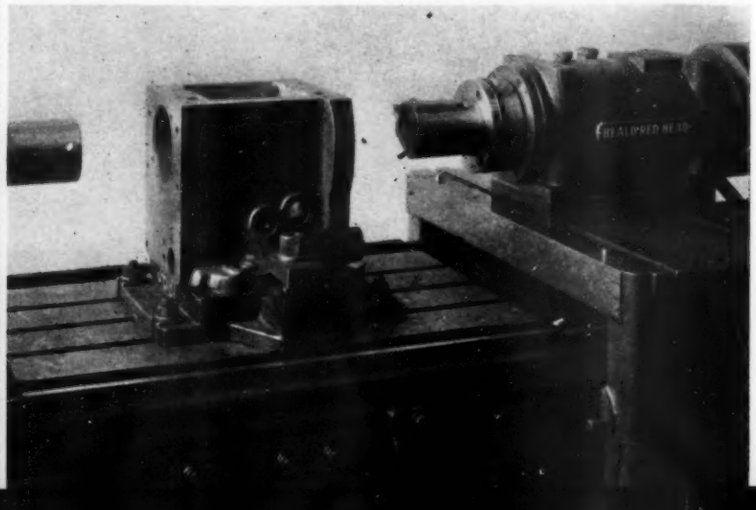
Another factor in the total economy secured by the use of this method is the reduction, if not the total elimination of scraping. This is particularly noticeable on such parts as have a flat base that mounts on another part of the machine. Pieces of this kind are seen in Fig. 9. The holes in these parts are bored with the base, or flat surfaces, accurately mounted on the boring machine in the same manner as on the bed where they will be assembled later. This method has appreciably reduced labor costs in assembling.

The way in which these parts are held for boring can be seen in Fig. 10, 11 and 12. The clamping and locating methods are simple and the loading time is short. Where possible the cutter head is made large and stiff to secure rigidity without an outer bearing. On some of the smaller holes the bar must be supported to insure accuracy, as in Fig. 10. While this resembles old boring bar practice, it must be remembered that the high cutting speeds that are now possible enable fast time to be made with light cuts and fine feeds. Extreme accuracy in machines of this type make it possible to secure results that could not be obtained by the old methods.

Fig. 12 shows a workhead body for one of the Bore-Matic machines. These are bored from both ends by short, stiff boring bars, removing $\frac{1}{32}$-in. of stock. The holes are 4.3307-4.3305-in. in diameter, one of them being $2\frac{1}{16}$-in. long. One end is also faced. The total machining time is 10 min. each.

Fig. 11—Through boring by a staff bar with adjustable inserted cutter





American Machinist — REFERENCE BOOK SHEET ©

Color Code for Marking Steel Bars

SIMPLIFIED Practice Recommendation R166–37 was issued on April 1, 1937, by the National Bureau of Standards, United States Department of Commerce, concerning a color code for marking steel bars. The work of preparing the recommendation was undertaken initially at the request of the National Committee on Iron & Steel of the National Association of Purchasing Agents. A recommendation was referred to all interests for consideration in August, 1935, and again resubmitted to industry in September, 1936. Since that time producers, users and others concerned have accepted the code.

The color markings provided in the code may be applied by painting the end or ends of bars having a diameter of 1 in. or larger. For bars less than 1 in. in diameter, in bundles that are to be marked with one or two colors, the colors may be applied either by painting across the end or ends of the bundle, or marked on tags attached to the bundles. Where two colors are provided the colors are applied side by side.

The code gives color data for:

1. Only the steels in greatest demand. The revised code provides for 89 steels, whereas the current SAE list covers over 140 chemical specifications.
2. Solid colors are reserved for carbon steels.
3. Striping is eliminated.
4. So far as possible, one color in combination with other colors is used for each series. For example, Table 2 shows that the key color for free-cutting steels is yellow, and that additional colors are added, such as brown, blue, red and black, to differentiate between different grades of free-cutting steels.

TABLE 1.— *Carbon steels*

SAE steel no.	Code color
1010	White.
1015	Do.
X1015	Do.
1020	Brown.
X1020	Do.
1025	Red.
X1025	Do.
1030	Blue.
1035	Blue.
1040	Green.
X1040	Do.
1045	Orange.
X1045	Do.
1050	Bronze.
1095	Aluminum.

TABLE 2.— *Free-cutting steels*

SAE steel no.	Code color
1112	Yellow.
X1112	Do.
1120	Yellow and brown.
X1314	Yellow and blue.
X1315	Yellow and red.
X1335	Yellow and black.
X1340	Do.

TABLE 3.— *Manganese steels*

SAE steel no.	Code color
T1330	Orange and green.
T1335	Do.
T1340	Do.
T1345	Orange and red.
T1350	Do.

TABLE 4.— *Nickel steels*

SAE steel no.	Code color
2015	Red and brown.
2115	Red and bronze.
2315	Red and blue.
2320	Do.
2330	Red and white.
2335	Red and white.
2340	Red and green.
2345	Do.
2350	Red and aluminum.
2515	Red and black.

TABLE 5.— *Nickel-chromium steels*

SAE steel no.	Code color
3115	Blue and black.
3120	Do.
3125	Pink.
3130	Blue and green.
3135	Do.
3140	Blue and white.
X3140	Do.
3145	Do.
3150	Blue and brown.
3215	Blue and purple.
3220	Do.
3230	Blue and purple.
3240	Blue and aluminum.
3245	Do.
3250	Blue and bronze.
3312	Orange and black.
3325	Do.
3335	Blue and orange.
3340	Do.
3415	Blue and pink.
3435	Orange and aluminum
3450	Black and bronze.

TABLE 6.— *Molybdenum steels*

SAE steel no.	Code color
4130	Green and white.
X4130	Green and bronze.
4135	Green and yellow.
4140	Green and brown.
4150	Do.
4350	Green and aluminum
4345	Green and aluminum
4615	Green and black.
4620	Do.
4640	Green and pink.
4815	Green and purple.
4820	Do.

TABLE 7.— *Chromium steels*

SAE steel no.	Code color
5120	Black.
5140	Black and white.
5150	Do.
52100	Black and brown.

TABLE 8.— *Chromium-vanadium steels*

SAE steel no.	Code color
6115	White and brown.
6120	Do.
6125	White and aluminum.
6130	White and yellow.
6135	Do.
6140	White and bronze.
6145	White and orange.
6150	Do.
6195	White and purple.

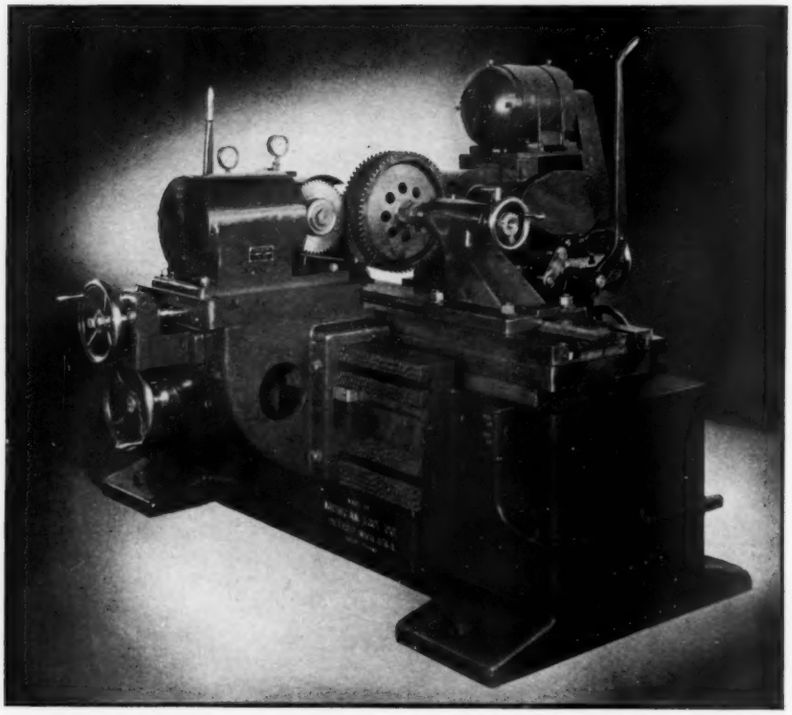
TABLE 9.— *Tungsten steels*

SAE steel no.	Code color
71360	Brown and orange.
71660	Brown and bronze.
7260	Brown and aluminum.

TABLE 10.— *Silicon-manganese steels*

SAE steel no.	Code color
9255	Bronze and aluminum.
9260	Do.

Shop Equipment News



Automatic cycle control, provided on the Michigan "Universal" gear-lapping machine, is adjustable for lapping cycles of 5 sec. to 20 min. in either direction

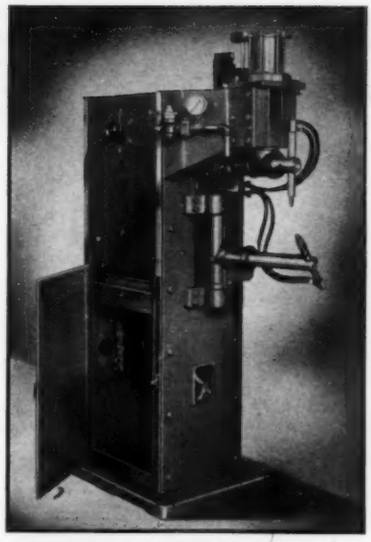
Michigan Universal Crossed-Axes Duplex Gear-Lapping Machine

Designed to lap gears ranging from 1½ to 20-in. in diameter and clusters up to 30 in. long, the universal crossed-axes gear-lapping machine announced by Michigan Tool Co., 7171 E. McNochols Road, Detroit, Mich., is of a duplex type with two laps. These laps may be used either for lapping front and back sides of gear teeth at the same time, with the machine running in one direction only, or may be set to lap two separate gears, as on a cluster, simultaneously. Change-over time for gears of the same pitch and helix angle requires about 5 min., while changing over for gears of entirely different characteristics takes about 20 min.

Duplex operation makes possible the economical use of this machine for short runs of a variety of gears. The machine is equipped with an automatic cycle control mechanism that is adjustable to permit lapping cycles ranging from 5 sec. to 20 min. in both directions, the machine running first in one direction and then reversing and running the same length of time in the other direction.

The lap at the back of the machine is the driving member, being driven by a 3-hp. motor. Work is mounted either between centers or on an arbor. Centers are mounted on a reciprocating table having a maximum stroke of 5 in. Table is driven by a 3-hp motor. The second lap at the front of the machine is driven by the work. This lap is provided with an adjustable hydraulic brake for establishing the correct lapping pressure. Mounting of the laps is such that they may be set at varying angles to the axis of the gear. Both lapping heads are mounted on slides, so that they may be moved to any desired position.

Primary adjustment for position of laps is through a handwheel and screws. A lever throws the front lap out of engagement for unloading. After re-loading, the lap head is brought up against stops for accurate re-locating. Change gears are used to obtain desired speeds. *(1)*



Armglo Model AP-35-S Air-Press Welder

Especially designed for welding stainless steel and galvanized iron, the Model AP-35-S spot welder manufactured by Armglo Co., Milwaukee, Wis., has a timing range from 2 to 35 cycles. This wide range of welding time and the design of the transformer makes possible welding stainless steel in gages ranging from No. 20 to No. 12. Water-cooling, pressure control and automatic timing prevent the stainless steel from losing any of its corrosion-resistant properties. Construction of the welder is of welded fabricated steel, with the exception of the base which is cast iron.

Capacity in spot welding sheet steel is from two pieces of No. 21 gage to two pieces of No. 7 gage clean steel. Weight of machine is 1,800 lb.; floor space required, 24x30 in.; height, 56 in. *(2)*

"Speed Treat X-1545" High Carbon Steel

"Speed Treat X-1545" is a 0.40- to 0.50-carbon, open-hearth, free-machining steel having a tensile strength of 110,000 lb. developed by Monarch Steel Co., Indianapolis, Ind. It is claimed that this steel approaches SAE 1112 Bessemer in free-machining, carrying a rating of 90 per cent. It is also claimed that it is from 5,000 to 10,000 lb. stronger in tensile strength than SAE 1045. It has good casehardening properties, giving a tough, ductile core of approximately 28 Rockwell *C* in combination with a surface of 63 to 66 Rockwell *C*. *(3)*

Rivett No. 112 Internal Grinder

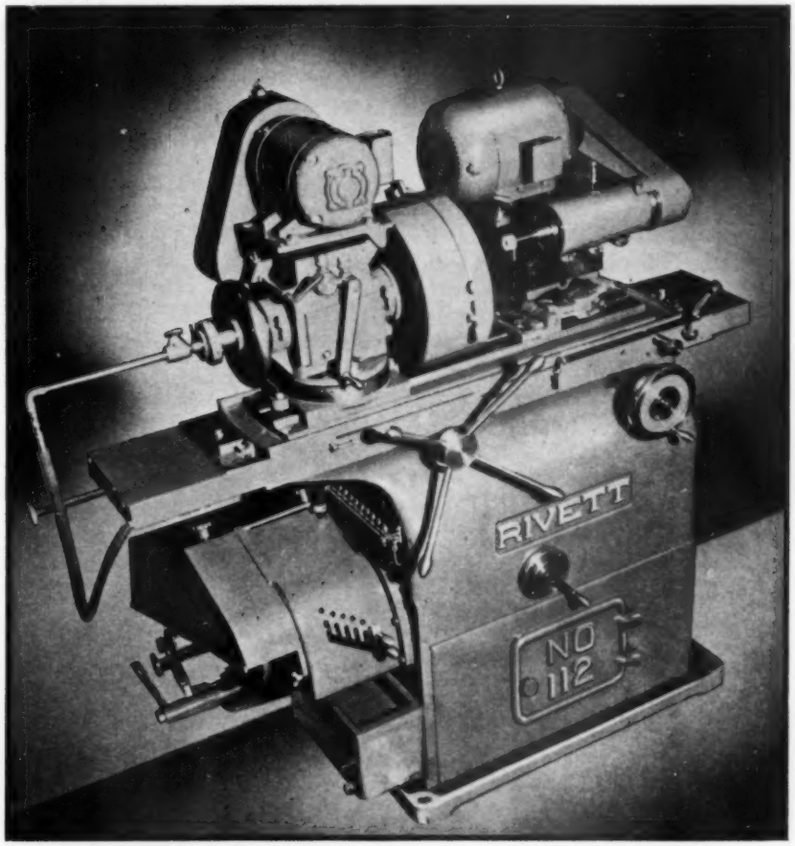
Designed for straight, bevel, two angle, or straight and bevel grinding at one setting, the No. 112 precision internal grinder offered by Rivett Lathe & Grinder, Inc., 20 Riverview Road, Brighton, Boston, Mass., can also be fitted with a low-speed spindle carrying a wheel up to 6-in. diameter by ½-in. face for external work. Single bevel or single taper work is ground by swiveling the workhead or the table top slide. By swiveling the cross slide to the desired angle and setting the grinding spindle on the center line of the machine, a straight hole may be ground using power reciprocation of the table; then, by disengaging the power reciprocation of the table and traversing the cross slide through a handwheel, an angle at the mouth of the hole may be concentrically ground without rechucking. Similarly, by swiveling the table top slide, a taper hole and a bevel may be ground.

Workhead and work reciprocate with the table, while the grinding wheel remains stationary. This arrangement is claimed to give vibrationless support to the grinding spindle and permit speeds necessary for small hole work. The base of the workhead is graduated to swivel 90 deg. each side of center so that the head can be set for taper grinding steeper than can be obtained by the 5-deg. swivel of the table. An individual motor drive provides three selective workhead spindle speeds.

Grinding spindle mounts in a bracket carried on the cross slide and is driven from a 2-hp., 3,500-r.p.m. motor. Selective hand or power cross feed is transmitted to the cross slide when in any position.

Table is mechanically reciprocated and the motion is arranged to slightly retard as the table approaches its center of stroke and accelerate immediately the center point is passed. This is claimed to overcome the danger of bell-mouthed holes. Eighteen selective speeds of table reciprocation are obtained through a gearbox mounted on the side of the base. All moving parts are fully inclosed and drive bearings, reciprocating mechanism, and table ways are automatically lubricated. Reciprocation is controlled by a tapered heart-shaped cam.

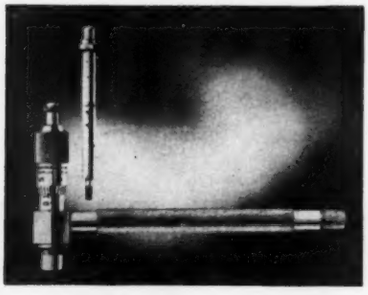
Specifications: grinding capacity,



hole diameter, ½ to 8 in.; automatic table travel, ½ to 8 in.; hand table travel, 16 in.; swing over table, 14 in.; cross feed dial graduated to 0.0005 in.; collet capacity, 1 in.; hole through spindle, $1\frac{5}{16}$ in.; height workhead spindle to floor, 50 in.; floor space, 55 x 40 in.; net weight with motors, 3,635 lb. Grinding spindle speeds are 10,000 r.p.m. for the high-speed spindle, and 4,600 r.p.m. for the low-speed spindle. *(4)*

B.&S. No. 268 Inside Micrometer

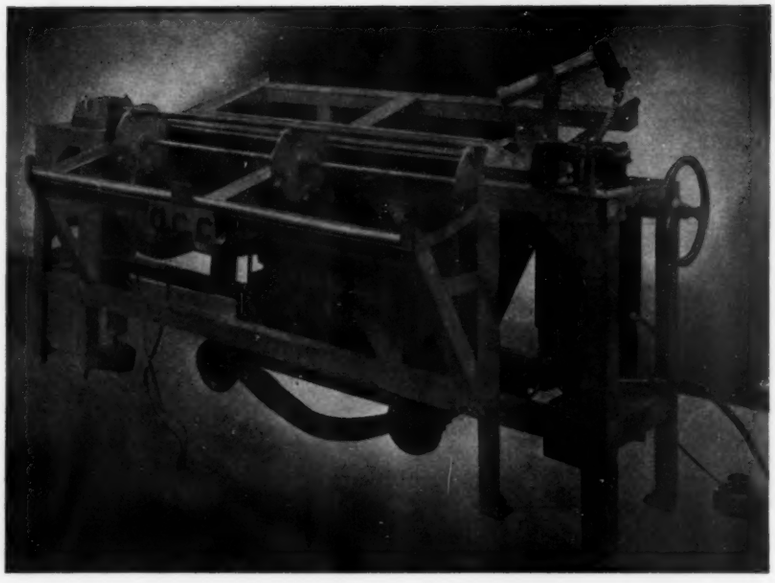
Inside micrometer No. 268, announced by Brown & Sharpe Mfg. Co., Providence, R. I., combines the advantages of a telescoping gage with those of an inside micrometer. When this instrument is inserted in a hole or recess, the telescoping measuring point adjusts itself to the work. The setting is locked by use of a knob



at the end of the handle. The tool is then withdrawn and the micrometer thimble is turned until it contacts the shoulder of the measuring rod. Measurement in thousandths is read directly from the micrometer and the length represented by the measuring rod in use is added to the micrometer reading. This instrument has a range from 2 to 6 in., and provision is made for adjustment to compensate for wear of the measuring points. *(5)*

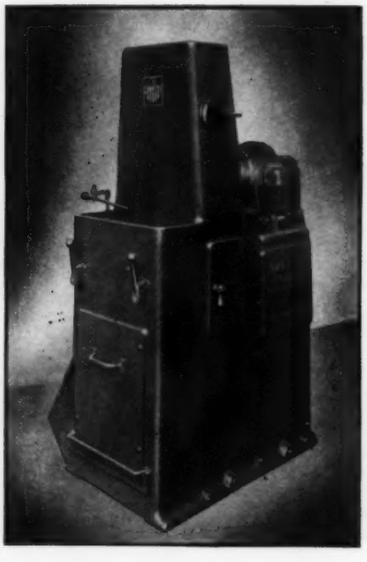
American Type PD Broaching Machine

Designed especially for rapid, accurate internal broaching, the Type PD hydraulic broaching machine offered by American Broach & Machine Co., Division of Sundstrand Machine Tool Co., Ann Arbor, Mich., is claimed to be easily set up and can be operated at high speed with safety. The operator merely places a work-piece on the pressure plate and passes the broach through the work into the



pulley head. He then places his right hand on the operating lever, his left on the safety lever. Both levers must be operated at the same time to cause any movement of the broach. Broaching completed, the operator removes the work-piece and returns the ram to its starting position, then lifts out the broach. Stroke-length is adjustable.

A standard 5 hp., 1800 r.p.m. motor drives the machine through V-belts. Specifications: capacity, 4 tons; diameter of cylinder, 4 in.; maximum stroke, 22 in.; cutting speed, 30 ft. per min.; return speed, 40 ft. per min.; work plate, 7 x 12 in.; bore in work plate, 3 in.; work plate height from floor, 39 in.; floor space required, 2¼ x 4 ft.; height over all, 6 ft.; net weight including motor, 2,500 lb. *(6)*



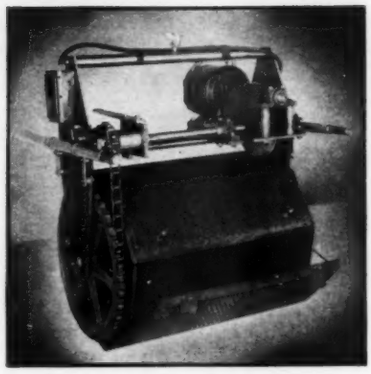
"A.C.F. Berwick" 6-Ft. Electric Bar Heater

American Car & Foundry Co., 30 Church St., New York, N. Y., offers the "A.C.F. Berwick" air-operated 6-ft. bar heater, which has capacity for 6-ft. long bars ranging from ⅜- to 1-in. in diameter. One electrode is counterweighted to take care of expansion of the bar being heated. Bars ½-in. in diameter and 6-ft. long can be heated to 2,000 F. in 30 sec.; a 1-in. diameter bar of the same length can be heated to 2,000 F. in 75 sec.

As shown in the illustration the bars are loaded in a rack at the back of the machine and are automatically lifted and carried to the heating electrodes. After heating, the bars are dropped into a rack at the front of the machine. A photoelectric cell, shown mounted above the right-hand electrode, is set to open the heating-circuit switch when the bar reaches the desired temperature. *(7)*

"Plating Products" Oxidizing Barrel

A portable oxidizing barrel for handling small parts has been announced by The Plating Products Co., 352 Mulberry St., Newark, N. J. It is claimed that this barrel can be used with almost any of the well-known processes of rust-proofing or black finishing by immersion. The barrel and drive machinism are made entirely of metal and the unit may be carried through all cleaning, rinsing and processing solutions without dam-



age. Motor drive is through a worm-gear reduction and clutch. Adjustable arms suspend the barrel from the top of the solution tank. Several sizes are available and perforations can be made to suit requirements. *(8)*

Acme Flexible "Steelbelt"

Flat-top "Steelbelt" announced by Acme Steel Co., 2836 Archer Ave., Chicago, Ill., is made of galvanized or stainless steel formed into links and joined with heavy-gage spindle wires. Wires have a self-locking feature at the ends, which are protected by flanges on the under side of the belt. Belts can be drawn over large or small diameter pulleys. Ridges on the under side add strength and provide a continuous level surface for idler rolls. It is claimed that the belt will not stretch, is easily cleaned and resists surface abrasion. Belts are available in solid type or with perforations to provide easy drainage and ventilation. *(9)*

Rockford 48 x 48 In. "Hy-Draulic" Double-Housing Heavy-Duty Planer

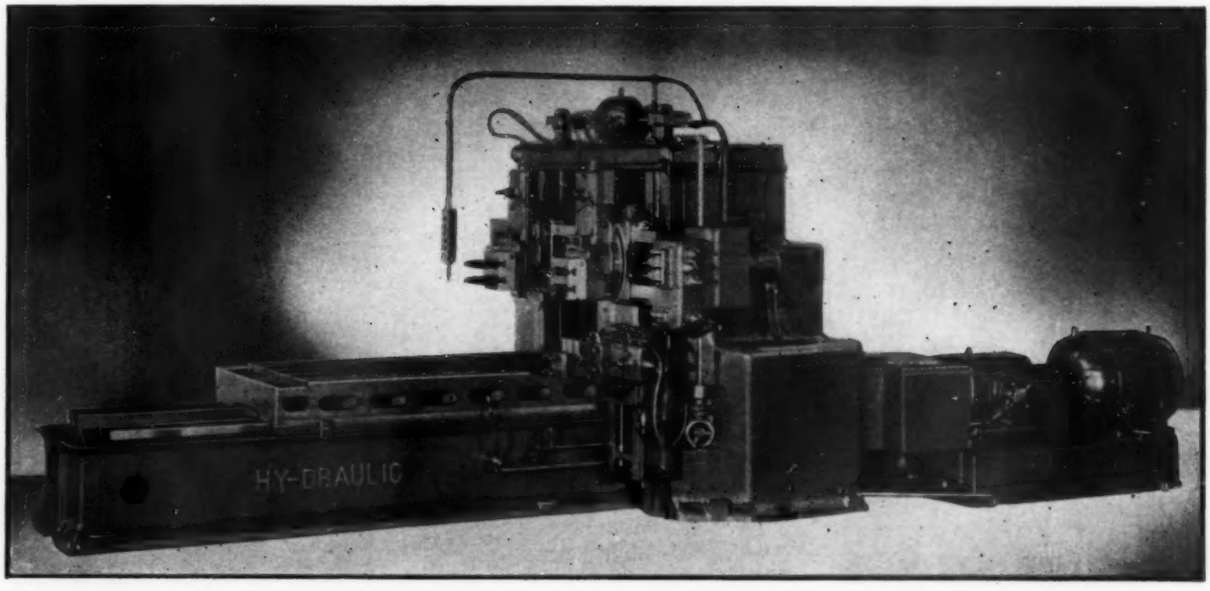
The double-housing 48 x 48 in. heavy-duty "Hy-Draulic" planer is a companion to the open-side planer of similar capacity previously described (*AM*—Vol. 80, page 314). Offered by Rockford Machine Tool Co., Kishwaukee and 23rd Sts., Rockford, Ill., the double-housing planer uses a constant-speed motor, with relatively simple controls, for driving the hydraulic unit. Cutting speeds are independent of return speeds and both have infinite adjustment between high and low limits. Reversals of table movement are claimed to be quick and smooth, short strokes can be made at near shaper speeds. Table can be stopped, inched, or reversed at any point in its travel. Cross feed to heads is hydraulic and can be adjusted to any desired amount between maximum and minimum. Feed takes place while the tool is clear of work, before entering the cut.

Double length bed provides support for the table at both ends of a full stroke. The table never overhangs. Control is from a pendant pushbutton station. Power elevation of the rail operates in conjunction with the automatic, hydraulic rail-clamp. Power rapid traverse to all heads in all directions is provided by direct-connected motor. The cross rail is one large casting in the form of an inverted U, having long vertical bearings upon the machined and scraped ways of the two columns, providing solid support for side-head subrails.

Hydraulic tool lifters are provided for all heads and are claimed to be smooth in action. There is no tendency to jar tool slides out of adjustment. Tool heads have six clamping bolts instead of the customary four. Slide adjustment is made from the front. Three levers provide complete control for power operated movement for both rail heads, including feed or rapid traverse to right or left, up or down, separately or in unison. Squared shaft ends and safety crank provide hand adjustment at both ends of rail. Side heads have similar controls. One-shot pressure lubrication is provided for rail heads, side heads and feed units.

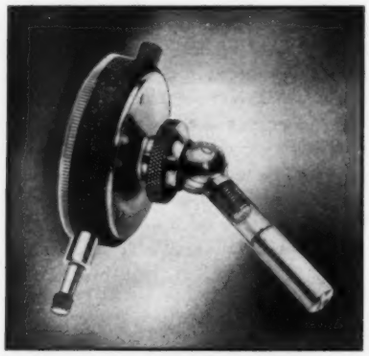
The planer is available with 8, 10, 12, 14, 16 and 18 ft. length of stroke. Length of table is one foot longer than length of stroke in each case. Specifications: width of table, 44 in.; depth of table, 9¼ in.; maximum distance, table to rail, 48½ in.; maximum travel of right- and left-hand rail-heads, 55 in.; maximum vertical travel of rail-head tool, 12 in.; horizontal adjustment of side head, 11 in.; height, floor to top of table, 32 in.; approximate net weight of 10 ft. machine, less electrical equipment, 54,000 lb.

Heavy-duty models are furnished with table cutting speed adjustable between 0 and 40 ft. per min., and



with table return speed adjustable between limits of 10 to 150 ft. per min. Maximum table pull of this model is 30,000 lb. The medium- and light-duty models have the same table return speed as the heavy-duty model; the table cutting speed being increased to 50 and 80 ft. per min. respectively. Maximum table pull is 24,000 lb. for the medium-duty model and 15,000 lb. for the light-duty model.

A 40-hp., 900-r.p.m. motor is required for the main drive. Rail elevation motor is 2 hp., 1,050 r.p.m. and the rapid traverse motor is 1 hp., 1,050 r.p.m. *(10)*



"Geneva" Universal Indicator Holder

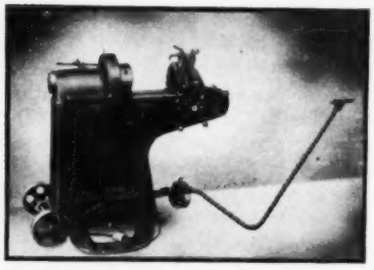
Chicago Dial Indicator Co., 180 N. Wacker Drive, Chicago, Ill., offers the "Geneva" universal holder for use with dial indicators. This holder permits universal setting because of its ball-joint construction. Movement is controlled by single knurled thumb nut, which permits the indicator point to be set in almost any position. The ball joint has a ¼ in.-28 thread to take round or square shanks. *(11)*

G. E. Long-Tube Mercury Lighting Units

A vacuum-type interrupting switch, now used in place of the "shifter" formerly used, is claimed to give instant starting and added dependability for the series of mercury lighting units of the long-tube, Cooper-Hewitt type, offered by General Electric Vapor Lamp Co., Hoboken, N. J. These complete lighting units, equipped with enameled reflectors of a new design, are claimed to have an over-all efficiency of about 15 lumens per watt. Both the reflector and tube are designed for mounting in a horizontal position. Power factor is 90 per cent for the 50-in. light source and 85 per cent for the 33-in. unit. Starting current shows almost no initial surge above the operating level. The 50-in. unit operates at 350 watts a.c. to supply the same light output which required 450 watts in previous models. The 33-in. unit operates at 280 watts. A "skylight" unit, combining the new long-tube light source with incandescent lamps, is offered for use where a close approach to daylight color values is required. *(12)*

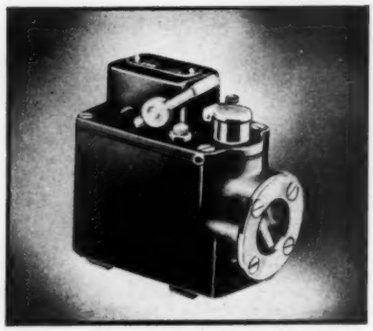
Landis Portable Pipe Threader

The 2-in. capacity "Little Landis" pipe threading and cutting machine, offered by Landis Machine Co., Inc., Waynesboro, Pa., is now available as a portable unit. As shown in the illustration, two wheels are used at the rear of the machine and a single guide wheel, in a unit with the handle, is used at the front end. The guide wheel and handle are detachable so that no interference from them is experienced by the operator when using the machine. Removing the handle and wheel automatically lowers the machine 2 in. to the floor, permitting it to rest solidly on its own base. The "Little Landis" machine has capacity for threading pipe from ¼ to 2 in. diameter or bolts up to 1½ in. diameter. *(13)*



Bijur Type "L" Automatic Lubricator

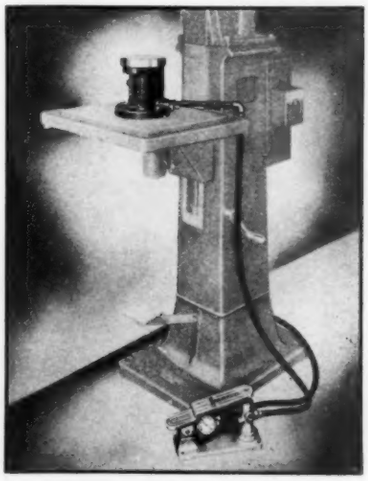
Having a reservoir capacity of ¼ pint, the Type "L" automatic lubricator offered by Bijur Lubricating Corp., 22-08 Forty-third Ave., Long Island City, N. Y., is claimed to be suitable for application on small machines. The pump units are supplied with or without reservoirs. A single line of tubing leads from the pump, and junction fittings permit branching at any point to suit the layout of the machine.



Pressing the small lever at the side of the lubricator raises the piston through a definite stroke, thereby drawing into the pump cylinder a definite volume of oil. On release of the lever, a metered quantity of oil is discharged under action of the piston-return spring. A pressure of about 50 lb. is developed in the system and metered distribution of oil to the various bearings is effected by the use of "Meter-Units." The Type "L" lubricator unit measures approximately 2x3½x3½ in. Piston stroke, which is adjustable, may be set to give a total oil delivery of from 2 to 30 drops as desired. *(14)*

Haskins "Air-Jig" for Tappers

An "Air-Jig" has been designed by R. G. Haskins Co., 4630 West Fulton St., Chicago, Ill., to increase the sensitivity of air-controlled tapping. Tap head of the tapping machine is held in a fixed position and the blanks are mounted on the jig and presented to the tap. An air-operated piston moves the jig table vertically, the

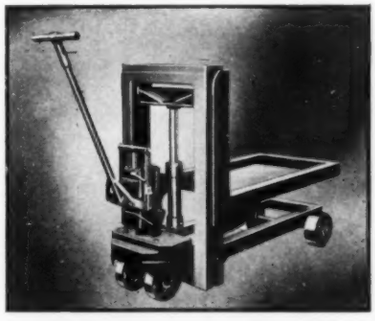


movement being governed by pedal control valve assembly, similar to that previously described (*AM*—Vol. 80, page 1060). This control valve unit consists of a pedal and base, plunger valve, pressure regulator and pressure gage.

This jig unit does away with the operator gaging the pressure that is applied to the tap. Not only is a uniform pressure maintained throughout the stroke, but speed of feeding and reversing the tap is also controlled. Pneumatic control can be accurately regulated to meet the requirements for each job. This jig unit has been applied to light countersinking, counterboring, reaming and spotfacing operations. Where the depth of such operations must be held to close limits, the constancy of air control results in uniform work. *(15)*

Lyon Hydraulic High-Lift Truck

The 10-in. hydraulic high-lift truck offered by Lyon Iron Works, Greene, N. Y., is an adaption of the standard hydraulic lift truck. It was designed for a special handling problem where the standard 3 in. elevation was insufficient. Truck is rated at 3,500 lb. capacity, has a 9 in. lowered height, 19 in. elevated height, and a 24 in. wide by 42 in. long platform. *(16)*



Reliance "Disk-Brake" Electric Motors

The "Disk-Brake" motor, announced by The Reliance Electric & Engineering Co., 1042–1090 Ivanhoe Road, Cleveland, Ohio, combines in a single unit the functions of a motor with those of a power brake. These units are designed especially for small cranes, hoists, auxiliary movements on machine tools and other equipment in which quick, automatic and accurate stopping or holding of a load is necessary. Reliance motors of any operating characteristics, both d.c. and a.c., may be specified.

The brake consists of a disk-type friction device, mechanically and automatically engaged when current is shut off and magnetically disengaged when current is applied. A "wear-indicator," combined with the manual brake release mechanism, warns when the brake needs adjustment. *(17)*

"Prenite 20M" Sheet Packing

A sulphur-free, neoprene-bonded, compressed asbestos sheet packing, listed as Prenite 20M, has been placed on the market by Mechanical Rubber Goods Div., The B. F. Goodrich Co., Akron, Ohio. This packing offers increased resistance to oil, as well as to such refrigerants as freon, methyl-chloride and sulphur-dioxide. It is available in 50x50-in. sheets, in $\frac{1}{32}$-, $\frac{1}{64}$-, and $\frac{1}{16}$-in. thicknesses. *(18)*

Coffing "Power Master" Spur-Gear Chain Hoist

Available in capacities from 1½ to 6 tons, the "Power Master" spur-gear chain hoist announced by Coffing Hoist Co., Danville, Ill., features gravity lowering, control of lowering speed by clutch and governors and provision of free chain for quick adjustment to the load. The units are light in weight, the 1½-ton hoist weighing 98 lb. and the 6-ton unit weighing 141 lb. It is claimed that control of gravity lowering is such that the chain can be stopped within a fraction of an inch. *(19)*

A-S-E "Unit-Robe" Group Locker

"Unit-Robe" steel group-locker units will accommodate sixteen persons with a floor space requirement of approximately ½ sq. ft. per person. These locker units, manufactured by the All-Steel Equip Co., Aurora, Ill., are made up of box-locker units, 12 in. wide, 12 in. high and 18 in. deep. These are assembled in two vertical columns of six units each and are connected across the top by horizontal sections consisting of four units. Directly beneath the horizontal section is a "hanger rod" to accommodate outer garments. Design of the assembly is claimed to prevent twisting and weaving. *(20)*

"Marks" Paint Bonding Process

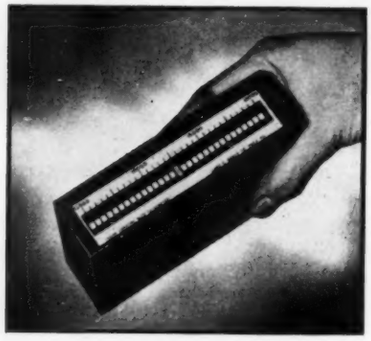
A bonding process to provide protection for metal parts against corrosion has been announced by Bonding Process Corp., 10401 Northlawn Ave., Detroit, Mich. Known as "Marks Bond", this material has considerable latitude in application. Surface produced is smoothly etched and forms a good base for paint or enamel where an even, lustrous finish is required. The process chemically produces a coating on iron or steel consisting of microscopic crystals which are integral with the metal and

have good adherence. Being insoluble in water, this coating effectively stops moisture which penetrates the paint film and provides a grip for the paint which will prevent flaking or peeling. *(21)*

"Frahm" Tachometers

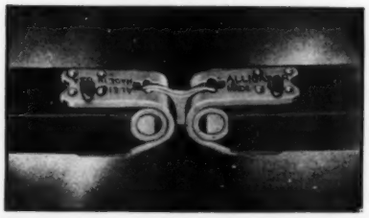
Designed to measure speeds ranging from 9,000 to 30,000 r.p.m., the "Frahm" high-range series of vibrating-reed tachometers, offered by James G. Biddle Co., 1211-13 Arch St., Philadelphia, Pa., are suitable for measuring rotational speeds of motors, turbines and similar equipment as well as measuring vibrations per minute of pneumatic hammers and drills. It is merely necessary to hold the instrument against or mount it on some stationary part of the machine or device.

These tachometers are available in a hand type for portable use and in types suitable for permanent mountings. *(22)*



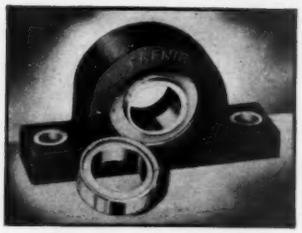
"Alligator" Flexible V-Belt Fastener

Designed especially for joining C-section V-belts of fabric core having cross-weave construction, the "Alligator" V-belt fasteners announced by Flexible Steel Lacing Co., 4607-31 Lexington St., Chicago, Ill., permit the installation, shortening or replacement of V-belts without the necessity of tearing down installations. Included in the design of these fasteners are double rocker pins supported in bronze bushings These pins are made of alloy steel, hardened to give long service. Design is such that no metal parts touch the pulleys. *(23)*



Fafnir Type RS Rubber Pillow Blocks

The addition of a wide inner-ring ball bearing with self-locking collar to the rubber pillow block, offered by The Fafnir Bearing Co., New Britain, Conn., permits easy installation of the Type RS pillow block. Built to inch rather than metric dimensions,



the bearings fit standard shafts without machining. Range is restricted to the smaller sizes, from ½- to 1 7/16-in. bore, making this line of bearings particularly suitable for use in unit heaters, air-conditioning equipment, and general heating and ventilating applications. *(24)*

Electroloy Improved Welding Electrodes

Two improvements in standard tapered spot-welding electrodes have been announced by The Electroloy Co., Inc., 50 Church St., New York, N. Y. In place of the conventional machined spot welding tip, electrodes cold formed from high conductive alloys are offered. This is claimed to produce a more uniform grain structure with an increase in hardness. This is claimed to result in an increase in the number of spot welds per tip.

Electrodes are also plated with a thin, electrically conductive coating of a special alloy which is highly resistant to oxidation. This plate is claimed to reduce heating of the electrode. *(25)*

EASY WAY TO GET MORE INFORMATION ABOUT THESE IMPROVED PRODUCTS

The description of each new product in the foregoing pages is followed by a number. Check off, on the coupon below, the products on which you wish further data. American Machinist will do the rest. You will receive the information probably within two weeks.

7-28

AMERICAN MACHINIST
330 WEST 42ND STREET, NEW YORK, N. Y.

Please have sent to me, without further obligation, catalogs or other information about the following new products described in this "Shop Equipment News" section. (Please check.)

1 ☐	4 ☐	7 ☐	10 ☐	13 ☐	16 ☐	19 ☐	22 ☐	25 ☐
2 ☐	5 ☐	8 ☐	11 ☐	14 ☐	17 ☐	20 ☐	23 ☐	
3 ☐	6 ☐	9 ☐	12 ☐	15 ☐	18 ☐	21 ☐	24 ☐	

NAME _____ TITLE _____

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Round Table

Believe in Signs?

"What's this fancy doodad on the wall, Al?"

"Oh that's a prize plaque for having the safest shop in the district. We didn't have any sort of accident over a three month period."

"I didn't know you were in that contest, Al. I haven't seen any safety posters here like they have in other shops. I meant to ask you why you didn't put some up too."

"I've seen them in other shops too, Ed. But I thought I'd try an experiment."

"What was that?"

"I didn't want my men to know anything about the contest and so I didn't put up any posters."

"What were you trying to prove, Al?"

"That I could win the prize without a lot of posters."

"And so you won it by accident."

"No accident at all, Ed. Do you remember when you learned to ride a bicycle?"

"Sure, but what's that got to do with this?"

"Remember how you almost always hit the stone or tree you were trying to avoid? You'd try your best to steer clear of it, but it seemed to have fatal attraction and the first thing you knew you'd hit it."

"Yes, but I still don't see the point."

"I figured it this way, Ed. If I'd plastered the shop full of safety signs and urged the men to be extra careful during the test period, they would have been nervous and jittery and much more likely to have an accident. So I chucked all the posters into the furnace and said nothing. Didn't even let them know we were supposed to be in the contest at all. As a result they worked along as usual with nothing to disturb them."

"Then why have any safety signs around a shop? Why not take them all down?"

"We only have safety signs at places where a warning seems necessary, such as the top of stairs, and

around machines that have a way of catching the unwary. But that is very different from having special signs scattered around that excite men with the spirit of contest."

"If our men are as jittery as that why don't we have more accidents?"

"They aren't jittery unless they are upset. I'll bet some of the shops with gory posters had more accidents than ever."

Is Al right in believing that dramatic posters may do more harm than good?

Discussion

The Conscientious Workman

Henderson is of the old school, where the section boss would lay off a workman if the work was not exact. I am reminded of a similar case that happened in a shop with which I was connected. The chairman of the Board of Directors was being shown through the shop by the superintendent when a mechanic, acquainted with the chairman, thought it would be a good chance to show off his good work.

When checked with a micrometer, the piece was exactly as specified on the drawing. The chairman, not a mechanic, praised the work, and the workman thought he had made a hit. A few hours later the workman was called in to see the superintendent. A print was produced and the workman was asked to read the dimensions of the part shown to the chairman.

Much to his chagrin this workman, instead of being complimented, was given a reprimand and told to use the "go" and "not go" gages provided and not waste so much time. The tolerances specified, it was pointed out, had been determined for the satisfactory performance of the assembled unit and it was not necessary to hold the piece to exact dimensions.

—Andrew J. Schwartz.

Men of the Henderson type are rare these days and Ed would be wise to think twice before letting him go. While it is irritating to see valuable time being wasted, I think it could be avoided if Ed took Henderson into his confidence. I have known men of the same type to re-

spond to an appeal that placed the dollars and cents angle of the situation clearly before them. Maybe Ed has been using the wrong approach, for psychology certainly cannot be excluded from the machine shop.

Men will often respond to a humorous situation that drives home the point at issue. In the shop where I served my apprenticeship, a new boy on a lathe, either from laziness or ignorance, had a habit of finishing work at the same speed he used for roughing. One day the foreman handed him a hacksaw and pointing to the change-gear speed box said, "Saw that thing off, you don't use it anyway." Not very subtle perhaps, but it worked.

—Robert S. Alexander.

The Open Door

The open door policy is one that depends entirely upon the man at the top. With a capable, broadminded man at the head of affairs such a policy will result in cooperation and harmony. No restrictions or rules are necessary, as such leaders always have time to handle promptly the smallest detail connected with the success of the plant.

—F. P. Terry,
Belfast, Ireland.

Wage Increases

Al is wise at this time in "keeping several steps ahead." He probably has in mind the person who is timid when it comes to asking for a raise, but as soon as he thinks that he is underpaid starts scouting around for a change that pays a few cents more. Once the individual gives notice the matter seems to end just there for many bosses. They think that it is poor policy to have the worker think that he can bargain for his services. It "saves face" to let the man quit and hire another even if it costs a little more.

—H. Shore.

The more conscientious a man is the more he dislikes to ask for a raise and the more favorably he reacts to any voluntary increase in wages. Attitude of the man toward his job is a most important thing. I would rather have a man who has the proper attitude, even if he may have less ability, than a skilled workman who doesn't care.

I believe in rewards to those who earn them. When rewards are properly given, men who are of real value to their employers understand and appreciate them.

—O. W. Winter.

Skill and effort should be justly rewarded without waiting until men ask for a raise. A foreman knows what a man is worth better than the man himself. If it is known that a foreman gives raises based only on worth and without asking, a more contented and efficient shop force will result. Reference to records will enable a foreman to show a workman in what respects he has failed to qualify for a raise, in many cases this will result in an improvement in the man's work.

—W. E. Warner,
Sompting, Sussex, England.

Al is showing good judgment in checking up and making decisions based on past results. Employees who listen for the whistle to blow before starting work and watch the clock for quitting time do not give their full-time efforts to their work. Workmen who show initiative, ability and interest in their work usually work for concerns that appreciate real effort. Management, to receive full cooperation from its employees, must show appreciation through the pay envelope as well as good working conditions.

It has been proved by experience that a two cents an hour increase, given through appreciation of past effort before the employee has to ask for it, is more pleasing than is an increase of five cents an hour when he had to ask for it.

—H. A. Gilliland,
Hamilton, Ontario, Canada.

Shouting Foremen

Supervisors of the "shouting foremen" type certainly have a place today. They are frequently more necessary than the much vaunted, tactful, diplomatic type. I like to see a foreman absolute boss of the shop, not afraid to speak. Shouting may not be dignified, but it is often called for. Some undisciplined, cantankerous men need rough treatment; they must be ruled, or they will rule and intimidate the boss. It is nice to play the gentleman, most foremen prefer it, but it does not always pay.

Wm. Bryce,
Tinsley, Sheffield, England.

I have never known of enduring success being achieved by concerns that favored the "loudspeaker" type of foremen. It is obvious that men who "get a move on" only by being shouted at could very well be done without. No good man would stand it very long.

I remember one occasion when I, as an engine erector, was given the job of setting some cylinder studs. I was pulling on the studs as hard as I could, but that did not suit the foreman. He handed me an 18-in. wrench with an order to pull the studs up tighter and left me to do it. I was pretty hefty and when my shouting boss came back he found a lot of ¾-in. studs wrenched off. Of course both of us were hauled up on the carpet, but I remained and he got fired.

I have had 50 years' experience as a foreman and have never found the need for shouting. If every man would show his resentment at being shouted at, the tribe of shouting foremen would soon be extinct.

—J. T. Towlson,
Enfield, Middlesex, England.

The foreman who is firm and expects obedience to all reasonable orders will retain the respect of his men, but the excitable, shouting foreman will never enjoy the respect or the confidence of his men. Most shops have a few "problem" individuals who will not respond to reasonable treatment, but who require strict discipline, and some of them may even be benefitted by an occasional call down. Every shop is a sort of human-relations laboratory. The foreman who studies each individual's personality and behavior can build up a crew of employees who will produce more and better work than will the same number of men working under a driving, loudmouthed foreman. Grievances caused by contact with despotic superiors will produce excessive labor turnover and, in some cases, may start serious labor troubles.

—Herbert M. Darling,
Superintendent,
Wells Tool Company.

Discourteous shouting is always an open invitation for trouble and any executive who permits it of his foremen is begging for grief. The foreman who storms around beyond the bounds of propriety and then attempts to smooth matters over by a slap on the back or by telling a funny story is doubly foolish. It cannot be denied that some workers require firm treatment and that it is in order when necessary, but it is possible to be as firm as a rock and yet be the soul of courtesy.

A shouting foreman should first be told of the management's policy in that respect. If he continues the practice, a warning that he will be demoted is in order.

—John E. Hyler,
R. G. Le Tourneau, Inc.

VOLUME 81 • AMERICAN MACHINIST, ESTABLISHED 1877 • K. H. CONDIT, F. H. COLVIN, EDITORS • NUMBER 15

Editorials

The King's Champion

SENATOR ROBINSON has paid the supreme sacrifice of devotion beyond his strength to his chief and to a cause for which he apparently had scant enthusiasm. Byrnes, Connery, Robinson—who is to be the next victim of the drive to force a revolution in our style of government regardless of the wishes of the people?

In our abandonment of the principle of government by law and our substitution of loyalty to individuals we are reverting to a custom of our Anglo-Saxon forefathers. For some six hundred years England's king had his champion, a member of the Dymoke family, whose duty it was to challenge all and sundry who might question the king's right to his throne.

During the coronation ceremony the champion entered on horseback, threw down his gauntlet three times, and proclaimed any man who disputed the king's majesty a liar, in the somewhat stilted language of the day. His reward was the charger on which he rode and the armor he wore (supplied by the king), and the gilded cup from which he drank the king's health.

Most of the king's champions performed ceremonial duties only, but there were some who lost their heads, one or two through kingly treachery.

Senator Robinson's reward was to have been a seat on the bench of the court whose power the bill he was defending sought to curtail. He did not live to find out whether that promised reward was to be his or not.

EVEN BEFORE he was laid away to rest his chief endeavored to designate as his successor a senator whose sole claim to the office of majority leader was his political "rightness" with the New Deal. The response to that bit of strategy was so vigorous that it was hurriedly disavowed.

Most of us, at one time or another, have to decide between loyalty to our principles and convictions, and loyalty to a group, a party or a man. Senator Robinson made that choice and died fighting for the man whose champion he was. If his death arouses those of us who have been asleep to how far we have drifted toward a dictatorship, it will not have been in vain.

A Word to the Wives

WHEN THE NEXT ELECTION rolls around some workmen and a good many workmen's wives are going to remember that it was Franklin D. Roosevelt who forced through the Wagner Labor Relations Act under which they are paying tribute to union leaders who are not accountable. It is this same law that cost the automobile workers six weeks' pay because of a strike most of them opposed. And that cost steel workers almost as much.

Before that election takes place there are likely to be many more wage destroying strikes, direct and sympathetic. Everyone knows, but the striker usually forgets, that it takes years to get back through an increase won by a successful strike the total loss of all income during the strike.

One of the most effective moves made in any strike has been the sending of the full transcript of the negotiations to all employees, and to their wives. It should be done wherever possible.

By the same token, the most effective weapon available to those opposed to the New Deal efforts to overturn our form of government would be a steady drive on the wives of working men pointing out how much such New Deal laws as the Wagner Act have cost them. Under the Act the employer probably cannot take any part in such a move but there is nothing to stop the women in a community from spreading the word to other women.

A word to the wives may not be entirely sufficient but it will certainly go a long way.

CHIPS

WASHINGTON

Roosevelt suffers worst defeat of career as Court bill goes to Judiciary Committee by 70 to 20 vote and Senate overrides his veto of 3½ per cent interest on farm loans, 71 to 19 . . . Lehman, Roosevelt friend, called court plan dangerous . . . Barkley steps into Robinson's shoes as Senate leader . . . Sales to China and Brazil reduce gold sterilization fund for first time . . . Bill introduced in Senate to create committee to study conservation of iron ore and iron and steel scrap . . . 21,000,000 workers now covered by unemployment compensation . . . Bill allowing married couples to work for government passed . . . F.T.C. charges Ford and General Motors with "false and misleading" advertising of prices . . . Experts estimate three years time to study reorganization of Government bureaus, bill introduced in House to provide six assistants to aid President in this study . . . Chamber of Commerce critisizes Wage-Hour bill for its ambiguities and interference with state rights . . . Also finds no agreement in decisions on 200 cases handled by N.L.R.B.

FOREIGN

France economizes to bolster franc . . . Britain looks for iron ore to replace former Bilbao supply . . . England sticks to plan for division of Palestine, to go before League of Nations next month . . . Eden warns Italy that Britain will fight to defend interests in Mediterranean . . . Germany makes agreement with Franco for raw metals . . . Italy and Germany exchange groups of police for three months periods . . . Quezon asks for Philippine independence by 1939 . . . Guglielmo Marconi dies in midst of micro-wave experiments which might have revolutionized war . . . Spain celebrates completion of first year of war with biggest battle to date . . . Japanese planes bomb Chinese troops which fail to move out of disputed territory as per last week's agreement . . . Russia continues with "house-cleaning" activities by drive to "purify" press . . . Batista announces 20-point plan to regiment Cuban industry in 3 years.

INDUSTRY

New firm, Bell Aircraft Corp., uses two new Allison 1,000-hp. engines in fastest Army bomber just completed . . . 2,200 young people (44) girls enrolled in Wisconsin apprentice system . . . A.F.L. will meet Aug. 21, in Atlantic City, to map campaign against J. L. Lewis . . . Lenox Shoe Co. of Freeport, Maine, offers to turn over business to employees to be run on cooperative basis . . . Ford Motor Company and eight individuals face trial for beating strikers . . . Steel prices to remain unchanged to end of year . . . Lamb, C.I.O., calls Gov. Davey "No. 1 Scab" . . . Atlantic and Gulf coast seamen vote to join C.I.O. . . . Boston manufacturer and C.I.O. sign contract with clause allowing discharge of anyone indulging in "anti-American activities."

FINANCE

Common stock prices during three weeks ending July 10 recover one-third of losses since March . . . Kennecott Copper gets tax refund of $76,535 . . . Twentieth Century Fund figures it would take every cent of eleven months work of U. S. working population to pay off national debt . . . British and French would have to work more than two years . . . Chicago Pneumatic Tool refinancing with sale of 70,000 shares of $50 par value stock . . . General Electric makes 91¢ per share in first six months of 1937 as compared to 58¢ in '36 . . . B. & O. buys interest in Keeshin Lines, nation-wide trucking system.

INDICATORS

Steel production not much change at 84.3 per cent capacity . . . Electric power output up to 109 . . . Business Week's index drops 0.2 to 79.1.

J. W. O'Leary Re-elected by Machinery and Allied Products Institute

CHICAGO—Manufacturers of machinery and similar durable goods have more at stake in the constantly changing national legislative scene than any other major industrial group, John W. O'Leary, president, Machinery and Allied Products Institute, told manufacturers and trade association executives who attended the annual meeting at Chicago, July 14.

"Much more than a proportionate share of constructive thinking and leadership in establishing and protecting sound economic and governmental policies has come from the durable goods group," he said. "This is probably due to the seriousness of the depression in the durable goods industries, which brought a realization of the importance of sound recovery policies. It is gratifying to see this uninterrupted devotion of time and effort, despite the urgency of local responsibilities of major executives in connection with their own production problems. With the many plans for drastic change in our form of government and economic system, it is extremely important that the same type of constructive thinking and leadership be vigorously applied."

Reports of widespread interest in and effectiveness of the Institute's program on depreciation reserve policies and trade practice standardization were made at the meeting.

Union Sells Carbide Die Business To Carboloy

Carboloy Company, Inc., Detroit, on July 15th, acquired the entire assets and interests in the cemented carbide business of the Union Wire Die Corp. which has been engaged in the manufacture and sale of Widia cemented carbide drawing and extrusion dies since 1928. In that year the Union Corporation was appointed United States distributor of Widia cemented carbide dies by Krupp Works, Germany. In the same year that the General Electric Co. licensed Carboloy Co., Inc. to manufacture and sell Carboloy cemented carbides in the United States.

It is expected that the new organization will combine the entire research, manufacturing, sales and service facilities of the two companies. Both types of cemented carbide dies will continue to be supplied as in the past and in the same sales channels.

New M.A.P.I. Officers

PRESIDENT
John W. O'Leary

VICE-PRESIDENT
Robert M. Gaylord
President, The Ingersoll Milling Machine Co.

TREASURER
Paul C. De Wolf
Vice-President, Brown & Sharpe Mfg. Co.

SECRETARY
Alexander Konkle

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W. C. Dickerman
President, American Locomotive Co.

M. F. Dunne
President, Pyott Foundry & Machine Co.

Robert E. Friend
President, Nordberg Mfg. Co.

Frederick V. Geier
President, Cincinnati Milling Machine Co.

Robert W. Gillispie
President, The Jeffrey Mfg. Co.

Leo W. Grothaus
Vice-President, Allis-Chalmers Co.

George H. Houston
President, The Baldwin Locomotive Works

W. B. McSkimmon
President, Union Twist Drill Co.

Philip M. Morgan
Treasurer, Morgan Construction Co.

W. S. Shipley
President, York Ice Machinery Co.

Guy A. Wainwright
President, Diamond Chain & Mfg. Co.

American Welding Society Nominates P. G. Lang, Jr.

Philip G. Lang, Jr., engineer of bridges, Baltimore & Ohio Railroad, has been nominated for president of the American Welding Society. He is to succeed A. E. Gibson, president, Wellman Engineering Co., Cleveland. G. F. Jenks, Ordnance Department, United States Army, Washington, has been nominated for senior vice-president. Divisional vice-president nominations are W. J. Sannemann, Tennessee Coal, Iron and Railroad Co., Birmingham, for the Southern division; and K. B. King, chief engineer, Standard Oil Co. of California for the Pacific Coast division.

Five of the following nominees for director at large are to be elected: A. M. Candy, Consulting Engineer, Hollup Corp., Chicago; J. H. Deppeler, chemical engineer and works manager, Metal & Thermit Corp.; E. R. Fish, chief engineer, Boiler Division, Hartford Steam Boiler Inspection & Insurance Co.; A. E. Gaynor, John Roebling's Sons Co.; L. S. Moisseiff, consulting engineer, New York; F. C. Fantz, vice-president, Mid-West Piping & Supply Co.; E. L. Mathy, first vice-president, Victor Equipment Co.; W. W. Petry, Cincinnati Milling Machine Co.; C. E. Woodman, Kansas City Bridge Co.

The new officers who are being elected by mail ballot by August 5 will assume their posts at the society's eighteenth annual meeting at Atlantic City, October 18-22, which is being held in conjunction with the National Metals Congress.

Golden Gate Exposition Grounds Almost Complete

Reclamation of Treasure Island at a cost of $3,800,000 for the Golden Gate International Exposition, San Francisco, is to be completed this summer.

A. N. Diehl, president, Columbia Steel Company, subsidiary of United States Steel Corp., signed a contract for 10,830 sq. ft. of space in the Hall of Mineral Industry which is now under construction. It is expected that the company's exhibit will cost a quarter of a million dollars.

A dozen separate construction contracts are under way and the permanent buildings which will be used as municipal airport facilities after the close of the Fair, will be completed by autumn.

Chicago Power Show Exhibit Space Rapidly Being Sold

Available exhibition space is decreasing rapidly as the list of exhibitors at the Chicago Exposition of Power and Mechanical Engineering grows. This exposition under the direction of Charles F. Roth, president, International Exposition Co., Grand Central Palace, New York, will be held in the New International Amphitheater, Chicago, October 4-9.

In addition to materials and equipment on display in connection with the power field, all phases of machinery which involve mechanical engineering are to be displayed there. These include precision instruments, power driven machinery, machine tools, materials handling systems, air conditioning systems, lubricants, heating, and ventilating and refrigerating machines. Special exhibits will be devoted to the problems of factory cleaning, lighting and other layout problems. Transmission problems are expected to be covered by a large number of working exhibits.

Machinery Manufacturers to Show at Iron & Steel Meeting

Several manufacturers of industrial machinery are represented among the 130 companies who have already signed up for some 80% of the space available for the Iron and Steel Exposition, which is being held in conjunction with the annual meeting of the Association of Iron and Steel Engineers at the Hotel Stevens, Chicago, September 28th–October 1st. Any information regarding the exposition can be secured by addressing the Iron & Steel Exposition, 1010 Empire Building, Pittsburgh, Pennsylvania.

Foreign Machine Tool Orders Increase in June

Orders placed for foreign delivery of machine tools increased in the month of June, representing 28 per cent of the total machine tool orders given last month. Domestic orders continued the downward trend of the previous month, according to figures recently released by the National Machine Tool Builders' Association. The erratic behavior of the month to month demand does not permit a true picture but when the three months averages are considered it will be noted the present slump represents only a minor drop in the curve and that the year's orders still remain well ahead of those for last year.

With McKinnon Chain

O. W. WINTER

O. W. Winter, Factory Manager at Columbus McKinnon Chain

Otto W. Winter has been appointed factory manager, Columbus McKinnon Chain Corp., manufacturers of chain and hoist equipment, Tonawanda, N. Y. Mr. Winter was formerly industrial engineer with the Kent-Owens Machine Co., of Toledo, Ohio. Prior to that time he served as general manager of the cutter division, Whitman and Barnes, Detroit, and sales engineer, Cincinnati Milling Machine and Cincinnati Grinders, Inc., Cincinnati. He also spent a period in the U.S.S.R. as a consultant to the Soviet Machine Tool and Cutting Tool Trusts.

Mr. Winter was the author of "Factors Affecting Milling Speeds and Feeds" (*AM*—Vol. 81, page 375).

He is a director of the American Society of Tool Engineers, and at the present time is chairman of the newly formed Toledo chapter of that society.

Financing for American Bantam Car Completed

R. S. Evans, president, The American Bantam Car Co., Butler, Pa., announced that of 90,000 shares of stock orginally offered in the new company, 85,000 shares had been sold and the remaining 5,000 had been withdrawn from the market.

Mr. Evans states that the company is now fully financed for production, has assets in excess of $1,500,000 of which one-third is in cash; and is free of all indebtedness except current liabilities of less than $15,000.

"During the past six months, while the company was being financed," said Mr. Evans, "engineering and designing of a new line of trucks and passenger cars was completed, commitments made and orders placed for materials. Production is scheduled for September."

Initial production will consist of quarter-ton chassis, panel and pick-up trucks, coupes and roadsters.

Performance claims include 60 miles on a gallon of gasoline, speeds in excess of 60 miles an hour.

The company purchased the properties of the former Austin Car Co. last summer. The plant was originally equipped in 1930 for a capacity of 40,000 cars per year.

Index of Machine Tool Orders

Based on Volume of Shipments for 1926

Month	Index of Orders: Domestic	Index of Orders: Foreign	Index of Orders: Total	3 Months' Average Index	% Foreign to Total Orders
1936 — July	104.4	45.7	150.1	132.6	30
August	96.1	31.4	127.5	135.5	24
September	82.9	35.6	118.5	132.0	30
October	105.4	31.1	136.5	127.5	23
November	110.7	36.4	147.1	134.0	25
December	205.7	52.0	257.7	180.4	20
1937 — January	156.1	44.0	200.3	201.7	22
February	122.4	42.8	165.2	207.7	26
March	172.1	39.5	211.6	192.4	18
April	232.5	50.0	282.5	219.8	18
May	161.4	47.1	208.5	234.2	22
June	137.6	54.2	191.8	227.6	28

Distribution of Orders

Average Indexes of Individual Companies Based on 1926 Level of Business	Companies in Per Cent of Total Number Reporting: 1936 1st Quar.	1936 2nd Quar.	1936 3rd Quar.	1936 4th Quar.	1937 1st Quar.	1937 2nd Quart.
200-up	13.0	17.2	15.8	28.4	31.6%	38.5
100–199	24.6	32.6	28.8	30.2	32.8	29.1
60– 99	22.4	19.0	22.9	19.5	16.4	15.1
20– 59	26.5	21.8	21.7	15.2	12.2	11.4
Less than 20%	13.5	9.7	10.8	6.7	7.0	5.9

WATCHING Washington

Court bill recommitted to committee . . . Administration candidate becomes party leader in Senate . . . Congress looks for August adjournment . . . National Resources Committee submits report . . . Navy considers appropriation cut

WASHINGTON—Senator Barkley's 38-37 selection as Democratic senate leader was scant recompense for the striking defeat suffered by the Administration when the Court Bill was recommitted to the hostile Judiciary Committee by a vote of 70 to 20. It is true that the committee was instructed to report within ten days a new bill relating to judiciary reform, but it was understood that the substitute measure would include no reference to the Supreme Court. If there is any face-saving in this, the opposition does not begrudge it, as the terms of surrender were their own.

Aside from the intrinsic merits of the Supreme Court fight, one outcome of the President's surrender is particularly significant. It is involved in his calling in the "regulars," the "Old Guard," to solve the situation. Coming on the heels of growing irritation on Capitol Hill about Brain Trust legislation drafting, it is apparent that from now on the old craftsmen will be on the job—which means a great deal so far as details of bills affecting business are concerned. Senators and representatives will get a better chance to protect the interests of their own constituents who may be hit by some trick phrase in a law from now on.

Salvaging the Schedule

Rush of Congress for adjournment, now that the Supreme Court deadlock has been broken, may upset the time schedule on the Congressional program but will have little effect on some of the measures most important to industry. If they are not enacted before adjournment, they will come up next time. All will be cleaned up pretty well before adjournment next year which will come just as the campaign opens for the congressional election of 1938. These measures include the farm bill, federal reorganization, tax loopholes, labor standards and housing.

Congressional leaders, including Vice-President Garner, now back in the saddle, are seeking early adjournment with August 15 as the tentative goal. Some effort is being made to salvage something of the Administration program but remnants may be confined to the wage-hour bill, farm legislation and a piece of the reorganization plan.

An attempt will be made to confine revenue legislation to an increase in the withholding tax to 25 per cent; to the overhauling of the personal holding company and to the taxing of a family as a unit. Administration leaders are anxious to defer until January any attempt to change the undistributed earnings tax, but they may not be able to prevent Senate amendments to that end.

Wage-Hour Bill

Wages and hours legislation is sure, but will be very conservative, probably along the lines of the bill reported by Senator Hugo Black, of 30-hour week and snooping committee fame. It is not important to pay much attention to the capers of the radicals who happen to be in the majority of the House Labor Committee. Their action is including retail employees — where the constitutionality is doubtful in the view of senators — and of giving the board power in its discretion to order wages up to 60 cents an hour instead of 40, and hours down to a minimum of 35 instead of 40, will NOT stand.

The whole House is conservative on this question, influenced by tremendous pressure on Southern representatives. The little sawmills which use negro male labor during off months from the cotton fields, for example, are potent politically.
—CARTER FIELD, *Washington Bureau, McGraw-Hill Publishing Co.*

It is known that an increase to 25 per cent has been recommended in taxing dividends going to non-resident aliens. This is the same rate applied by the British, but thinking of its trade agreement program, the Administration is anxious to do nothing to create the impression abroad that it is discriminating against foreigners.

Among the inventions listed by the National Resources Committee in their recently released report are the mechanical cotton picker; air conditioning equipment; plastics; the photo-electric cell; artificial cotton and wool-like fibers made from cellulose; synthetic rubber; prefabricated houses; television; the automobile trailer; gasoline produced from coal; steep-flight aircraft and tray agriculture. In short they gave the obvious answer to the question, "What developments will play an important part in technological changes during the next twenty years?"

The report recommended a federal committee for keeping abreast of technological changes and for forecasting imminent changes that may affect national life; also a series of continuous studies to be undertaken by existing planning boards and by appropriate agencies developed by the federal government.

Significant is the comment of the President on releasing the report: "While it is certain that much of the unemployment caused by the march of technical advance is absorbed by new occupations born of new industries, it is equally true that in the meantime labor must pay a very heavy price through readjustment and adaptations necessary on the part of workers whose jobs are affected by change. Employers likewise are deeply affected by swift technological changes producing obsolescence of capital investment . . . Study and investigation of technological advances and their social implications constitute one of our most important American planning problems."

Navy Cut Distributed

The Navy is a bit upset about the ten per cent cut suggested by the President. The ten per cent, of course, can be distributed as the department sees fit, but it must average ten per cent.

For a while the Navy discussed loading the cost almost entirely on machine tools, but they gave up that idea. So as matters stand only ten per cent will be cut off the machine tool money. The new appropriation became available July 1.

Commerce Department Studies Conditioning Equipment Sales

The increasing use of air-conditioning apparatus in the United States with the resulting demand for increasingly large quantities of water much of which is discharged into sewerage systems after being used once. is a matter of growing concern to officials of many municipal governments, according to a study made public by the Marketing Research Division, Bureau of Foreign and Domestic Commerce, Department of Commerce.

Installations of air-conditioning units have increased approximately 1,400 per cent from 1933 to the end of 1936 and horsepower used increased from 168,880 at the end of 1932 to 432,796 at the end of 1936, yet the trend of air conditioning sales continues upward more sharply than in any past year. Consequently the need for water for this purpose is a matter of serious consideration to manufacturers and city water authorities alike. Thirty-eight of the ninety-two cities of 100,000 population or more reported upon in the study have taken steps or are considering the limiting of the use of water-using air-conditioning equipment. Certain cities require the use of cooling towers or other equipment to obviate the necessity of discharging water into the sewage system.

Many of the cities included in the study are already using the full capacity of their water system and others are using from 75 to 90 per cent of the available water capacity. Since the demand for airconditioning equipment is a growing factor cities will be forced to provide more capacity. This condition evidences a potential market for millions of dollars worth of water works equipment and sanitary works equipment, as well as building and other materials, according to the Commerce Department.

The study was prompted by many requests for information on the subject and is designed to furnish manufacturers of air-conditioning equipment with an effective indication of the market possibilities in each of the 92 cities and thus enable them to plan their sales activities, especially as to types of equipment, to the best advantage.

Similarly the study should be of value to the water supply companies or the municipal authorities that are responsible for providing an adequate water supply.

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Canadian Aircraft Plant

The British Columbia Aeroplane Syndicate has been formed to acquire a manufacturing site and establish an aircraft factory. This syndicate, headed by Percy Winterborne, of Vancouver, has purchased 70 acres of land adjoining the Vancouver civic airport. Plans are being formulated for financing a $5,000,000 company for the purpose of building English aircraft types under license.

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Binks Manufacturing Co., Chicago, manufacturers of spraying equipment and devices and spray booths is to spend approximately $70,000 for new building and equipment.

Simplicity Manufacturing Co., Port Washington, Wis., manufacturers of cylinder boring and grinding machines, garage tools, etc., is building a factory addition to handle a Montgomery, Ward & Co. contract.

The DeVilbiss Co., Toledo, Ohio, announces the schedule of their training school for those interested in learning the technique of spray painting and the use and care of spray painting equipment. Classes which last for one week will begin on August 23, September 27, October 25, November 15 and December 13.

The Detroit Rex Products Co., Detroit, manufacturer of degreasing machines, has opened a branch office at 812 Huron Rd., Cleveland.

Harrison Radiator Corp., Lockport, N. Y., a division of General Motors manufacturing automobile radiators and kindred products, is adding two one-story units, 40x240 ft. and 356x520 ft., for general production operating and executive service. The plant is expected to cost $500,000 with machinery.

Industrial Review

• IF THE PRESENT lull in machinery buying is only temporary, as is confidently expected, it will prove helpful to the industry. A period where orders run ahead of shipments is a refreshing change after a period when sales have been scarce but hardly a wholesome diet. Shops that overestimated their capacity are glad of an opportunity to gain ground on promised deliveries; those that gaged their output correctly are pleased at the prospect of quoting closer shipping dates. All of which, combined with a decidedly improved labor outlook, sets the scene for a resumption of the uptrend during the last quarter.

• NEW ENGLAND finds that business has dropped off a good deal but looks for a decrease in political and labor uncertainty to bring back volume. In the New York territory a healthy market prevails but with the level below that for June. Long deliveries and vacations of some of the buying executives are in part responsible for the seasonal slowing up. Inquiries continue to come in. Both orders and inquiries have declined materially in Philadelphia, but distribution of orders is better in that more buyers of single tools are in evidence. Buyers of last December and first quarter are busy installing and operating their new equipment.

• PITTSBURGH has felt the let-down after a good start in the first weeks of July. Inquiries have declined with orders, and it looks as though August volume will be subnormal. In Cincinnati the same conditions prevail, caused largely by the summer vacation period and jittery nerves on the part of some industrialists. Labor agitation has slowed down a bit. A substantial number of inquiries for new machine tools is being received in Toledo although orders are not being placed as rapidly as during the first few months of the year. Machine tool business is at a low ebb in Detroit, but an increasing volume of inquiries indicate a good last quarter. A large volume of supply orders is being received, but quantities are small showing hand-to-mouth buying still the vogue.

• IN CHICAGO, July and August will be slower than preceding months, but some nice business is being placed. Some dealers report that they are doing better than in May and June. Here again it appears that the fourth quarter will bring a new upturn in volume. Business in Milwaukee is keeping up with no signs of appreciable falling off. The main concern is in making shipments. Here is still a great shortage of skilled labor in this city. Despite the summer let-up in Indianapolis, July and August look better than similar months in many years. Sales in Indiana and Kentucky should continue at a good figure for some time to come. In St. Louis business is quiet, but a fall improvement is anticipated. On the Pacific Coast volume is about ten per cent better than a year ago but slightly under that of late spring.

Detroit LETTER

Labor troubles delayed 1937 model completion . . . Changes for 1938 not exciting . . . Small car demand surprises . . . Represents 40 per cent of Ford sales . . . Briggs needs parts and moldings plant . . . U.A.W. divided on eve of convention

DETROIT—Though the end of the '37 season is in sight, car production continues at a bold pace. Ford assemblies are down until August 9, but General Motors and Chrysler are dashing along at full speed yet. Pontiac built well over 7,000 cars last week and the same amount the previous week. G.M. divisions will go into August with operations high and will suddenly halt work on current models about the middle of the month without much effort at tapering off. After two or three weeks—about as short a shutdown as ever known—manufacture of parts for '38 cars will start.

Busy Summer

Late summer is a busy time in southern Michigan, now that new car introductions come so early in the fall. It is a screwy period for most production executives who must keep up activities on current models while preparing their shops for new models. Despite the best intentions to wind up 1937 output early, this hasn't been possible in some cases because of delays caused by labor trouble. These delays have by no means been confined to plants like General Motors, Chrysler and Hudson which had long strikes, but have extended to factories which have been plagued with minor difficulties. Packard is one sufferer, having to prolong operations an extra two weeks.

Changes for next year aren't going to be very exciting. In fact, car makers are wracking their brains trying to think of what to feature in their advertising and selling. Most of the innovations that will make customers gawk and talk are being held over until 1939. Business is good enough, however, that cars will be bought in huge numbers for another year without resorting to costly changes. The relatively small tooling charges for '38 will help keep up motor earnings, despite the fact that the increase in retail prices may not cover recent boosts in manufacturing expenses.

The demand for small cars has been a notable development of the past season. Willys has met with unqualified success, having built over 55,000 units thus far during the current model year. It is adding a coupe priced at $499 at the factory and will introduce a commercial car at the New York Show. The coupe has a seat 50 inches wide, claimed to be the widest offered in any low-priced car of that body type. Willys is stressing the roominess of the car. It is understood that 1938 Willys models will be somewhat larger than current models.

Economy Car Success

Even the Ford people have been surprised at the reception of their 60-horsepower V-eight, known to the trade as the 52. They had figured that its sales would run from 25 to 33 per cent of all Ford V-eights, but instead they have been around 40 per cent. Ford consequently has been scurrying to expand its tooling on the 52 so that if necessary 250 units an hour can come off the line at Rouge. Reports that Ford may expand its body manufacturing operations at Rouge cannot be confirmed, but enlargement of its capacity there would not be difficult. Incidentally Ford will put hypoid gears into the Lincoln-Zephyr next year—which may be a forerunner of hypoids in the V-eight the following year. Ford apparently has dropped entirely its plans for a centralized tool shop; however, it has bought a large number of new machines for its various tool rooms.

General Motors of Canada at last has decided to make all its own standard transmissions instead of importing some of the parts from G.M.'s Michigan plants. Accordingly McKinnon Industries, Ltd., at St. Catharine's Ont., is in the midst of purchasing equipment to build 25 passenger car transmissions and five truck transmissions an hour. The automatic transmissions for Oldsmobile will be imported from the Buick factory at Flint. Ternstedt is now buying light presses and other machinery for its new eastern factory at Trenton, N. J.

Briggs Busines

The proposed merger of Briggs Mfg. Co. and Motor Products Corp. has fallen through because of militant opposition of the latter's minority stockholders. With its Chrysler business having grown by leaps and bounds, Briggs is in need of a division to make moldings and other smaller stamped parts in which Motor Products has specialized. Hence Briggs has announced that it intends to add a new department soon to fabricate such parts. After it was reported to have considered letting an outside organization sell its stamped steel plumbing ware and even to have debated dropping its plumbing ware division entirely, Briggs finally has decided to go into that end of its business on a bigger scale than ever before.

Southern Michigan is looking up as a rubber manufacturing center. Goodyear has a new factory at Jackson capable of large tire production, while Goodrich is putting into operation shortly a mechanical rubber goods plant at Cadillac. Firestone Steel Products Co. will make tire rims at a plant to be constructed down the Detroit river. The new Firestone automobile air spring also will be made there. It is a valve-controlled air cushion in the form of a rubber bellows intended to replace the conventional type of steel spring. Ford is rushing to completion a tire factory at Rouge. U. S. Tire has long had one of the industry's largest tire plants in Detroit.

Graham-Paige is the first company to experiment with nickel plating of piston rings. The results are said to be most satisfactory. There isn't likely to be much change in materials for pistons and bearings for '38. Much more experimental work remains to be done before further companies adopt cast crankshafts. Ford continues the only company using a cast crankshaft.

The United Automobile Workers are divided into two camps as their Milwaukee convention approaches.

The Rightist group is led by President Homer Martin and will present an entire slate of officers for election, consisting of Mr. Martin as president; Richard Frankensteen as first vice-president; Russell J. Merrill, president of the South Bend local, as second vice-president; and Walter Wells and George F. Addes to succeed themselves as third vice-president and secretary-treasurer respectively. The Leftist group, captained by First Vice-President Wyndham Mortimer and Walter Reuther, president of Detroit's West Side local, is to work for the reelection of Mr. Mortimer and of Ed Hall as second vice-president. It has endorsed R. J. Thomas, president of the Chrysler local, as third vice-president and Mr. Frankensteen as fourth vice-president. Mr. Addes is on the slate to succeed himself. John L. Lewis and the Leftist element would like to throw out Mr. Martin as president, but he is too strong with the rank and file and may be reelected with little opposition.

Shop Stewards?

Four weeks has now passed without a strike in General Motors plants, which confirms the suspicion that the U.A.W. could have controlled unauthorized strikes long before it did if it had wanted to. General Motors is shortly to consider demands made on it by the U.A.W. for changes in its agreement. One of the union's biggest efforts will be to get the corporation to consent to establishment of a shop steward system to reprace the present set-up of grievance committees. Shop stewards would have the task of collecting dues as well as of handling grievances. It isn't hard to imagine that the combination of the two duties would make easier the job of collecting dues.

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R. L. MORRISON is now general manager, Bendix-Westinghouse Automotive Air Brake Co., Pittsburgh, subsidiary of Westinghouse Air Brake Co. and of Bendix Aviation Corp. He succeeds the late R. M. HEINRICHS.

SPAULDING F. GLASS has joined the United Drill & Tool Corp., 100 So. Jefferson St., Detroit, as assistant treasurer. He was formerly senior technical advisor of the technical staff under the Commissioner of Internal Revenue, Washington, D. C.

National Tool Co., Cleveland, has been reorganized with the following officers: A. J. BRANDT, president; E. J. LEES, formerly of Lees-Bradner Co., vice-president and chief engineer; L. M. PROSSER, with General Motors Corp., vice-president and treasurer.

France Makes Few Changes in Industrial Import Quotas

Import quotas for the third quarter of 1937 for certain industrial products have just been published with only a few important changes, according to cables received by the Department of Commerce from Acting Commercial Attache Daniel J. Reagan, Paris.

The changed allotments for the third quarter are as follows, in metric tons, with second-quarters allotments shown in parenthesis: Radio tubes, 8.6 (6.4); dynamo electric machines, 0.1 (55); and motorcycles, 2.95 (0.45).

The normal and supplementary quotas on tractors are reduced by 33.2 metric tons because of overshipments in the second quarter, and a special supplementary allotment of 135 metric tons is granted for tractors weighing 4,000 kilos and over. The quota on domestic electric refrigerators is exhaused for the third quarter. Normal and supplementary quotas for automobiles and parts are reduced by amounts equivalent to advance licenses issued during the second quarter. For aluminum manufacturers, not otherwise specified, a special supplementary quota of 5.25 metric tons is granted.

Dun & Bradstreet Analyst Reports on Machinery Survey

That manufacturers of machinery sustained a net loss of 4.95 per cent based on working capital in the five years, 1931-1935, was revealed in the latest revised edition of "Behind the Scenes of Business," by Roy A. Foulke, analyst for Dun & Bradstreet, Inc. Figures given in this book show that the machinery companies lost 18.72 per cent in 1931 and 17.91 per cent in 1932. The profit for 1935 was 10.96 per cent.

Included in the survey are figures on net sales, turnover, relation of fixed assets and current debts to tangible net worth, and turnover of net working capital. It is interesting to note that the average collection period in days was as follows: 73 days in 1931, 97 in 1932, 92 in 1933, 79 in 1934 and 69 in 1935.

The survey in all contains 60 sets of balance sheets and operating ratios among manufacturers, wholesalers, and retailers. It includes a list of "terms of sale" in sixty lines of industry based on the examination of thousands of credit reports in the various fields.

The effects of age and over-expansion in business enterprises and the imperative need for personal "conscience" in the management of large corporations are discussed.

Fourth Edition of Who's Who in Engineering Now Ready

The fourth edition of Who's Who in Engineering has just been published. It includes a biographical dictionary of engineers, a directory of engineering organizations in the United States and brief descriptions of each of several functional instrumentalities of engineering societies. The book can be obtained from Lewis Historical Publishing Company, Inc., New York.

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C. M. YODER, president, Yoder Co., manufacturers of special machinery, Cleveland, has gone to England for several weeks' business trip.

M. J. KEARINS, president, Whitman & Barnes, Detroit, left July 17 for an extended trip in Europe, to contact Whitman & Barnes distributors. He will return to America late in August.

R. R. WEDDELL, manager of the small tool division, Ingersoll Milling Machine Co., Rockford, Ill., is in Europe on a short business and pleasure trip. Mr. Weddell plans to visit various tool concerns in England regarding developments of inserted blade cutters.

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The High Speed Hammer Co., Inc., Rochester, N. Y., has appointed MAURICE MAYER, 49 Pearl St., Hartford, Conn., as direct factory representative.

General Plastics, Inc., North Tonowanda, N. Y., manufacturer of plastics for mechanical industries, is planning expansion which will cost approximately $150,000 with equipment.

Westinghouse Electric & Mfg. Co., Springfield, Mass., has let contracts for buildings for expansion in the metal-plating division and foundry.

Cleveland Chain & Mfg. Co., Cleveland, is spending approximately $58,000 for one-story addition and equipment.

Light Alloys Mfg. Co., Painesville, Ohio, was recently organized to succeed Light Alloys Co. A. E. WALTON is president and R. E. PALMER is vice-president and treasurer. The company has leased the former factory of Bakelite Co., Richmond St., for the production of aluminum castings and kindred specialties.

1939 New York Fair Begins Sale of Space

New York World's Fair, Inc., announce that several industrial companies have already contracted for space at the 1939 Fair. Plans for the Halls of Production, which are to be next to the central building of the Fair, are rapidly nearing completion. The first plans of the hall for metals provides 22,144 sq.ft. of exhibit space.

It is expected that the Fair will build 25 or more strictly exhibit inclosures, and that some 50 additional structures will be erected by private exhibitors. In Fair-built halls space will cost $14 per square foot. Prices for building lots are scaled to size and location. Up to 20,000 sq.ft. the cost is 20 cents per square foot. Above that amount the price decreases in accordance with the amount purchased. Frontage on main thoroughfares cost $25 a front foot, grading down to $5 a front foot on the subsidiary streets.

Among those who have taken space are: the Westinghouse Electric & Mfg. Co., 10,522 sq.ft. in the Electrical Production Building; General Electric Co.; Johns-Manville Corp.; United States Steel Corp. subsidiaries, 55,166 sq.ft. of space in the Means of Production zone. John A. Roebling's Sons Co., 1,575 sq.ft. in one of the Halls of Production; International Business Machines Corporation, 3,653 sq.ft. in the Hall of Business Administration.

Richard Prosser, Senior Member, Thomas Prosser & Son, Dies

Richard Prosser, senior member, Thomas Prosser & Son, engineering and steel importing firm of New York, died July 12 at the age of 72.

Mr. Prosser spent his entire life with the Prosser firm which had been founded by his grandfather in 1845. The firm has been the general United States representative of the Krupp Works, Germany, since 1851 and imported a large part of the steel locomotive tires and wheels used on American and Canadian Railroads. Cemented tungsten carbide was recently introduced into this country by the firm as a cutting tool material.

Mr. Prosser was also president, American Saw Mill Machinery Co., Hackettstown, N. J., director, American Saw Works, Hackettstown, N. J.; Corley Mfg. Co., Chattanooga, Tenn.; and Jas. W. Pyke & Co., Montreal.

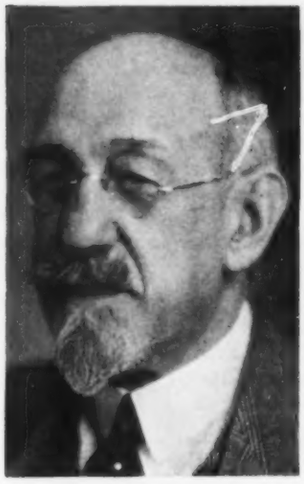
Exports of Machinery During May, 1937

	May, 1937	April, 1937	May 1936
Electrical machinery and apparatus	$10,372,561	$11,009,517	$8,426,588
Power generating machinery (except automotive and electric)	1,119,050	1,427,898	679,873
Construction and conveying machinery	2,138,440	2,030,026	1,109,277
Mining, well and pumping machinery	5,429,705	5,938,467	2,755,177
Power-driven, metal-working machinery	5,044,632	5,119,671	2,959,866
Other metal-working machinery	380,582	368,435	430,219
Textile machinery	738,091	736,116	705,401

Exports of Metal-Working Machinery During May, 1937

	May, 1937	April, 1937	May 1936
Engine lathes	$297,634	$294,734	$112,060
Turret lathes	297,802	209,899	89,399
Other lathes	122,465	69,537	166,548
Vertical boring mills and chucking machines	195,843	209,898	100,561
Thread cutting and automatic screw machines	309,802	365,281	167,329
Knee and column type milling machines	325,522	385,675	25,743
Other milling machines	193,129	397,406	105,293
Gear cutting machines	234,843	302,463	24,017
Vertical drilling machines	65,994	47,691	34,104
Radial drilling machines	39,630	16,824	1,717
Other drilling machines	114,045	183,673	51,400
Planers and shapers	188,193	27,101	23,802
Surface grinding machines	130,466	216,352	43,113
External cylindrical grinding machines	238,488	116,143	42,023
Internal grinding machines	168,356	224,992	43,186
Tool grinding, cutter grinding and universal grinding machines	185,458	198,768	109,476
Other metal grinding machines	75,411	194,907	106,365
Sheet and plate metal grinding machines	284,933	459,370	399,003
Forging machinery	174,571	128,788	118,751
Rolling mill machinery	710,222	399,390	723,294
Foundry and molding equipment	133,974	90,257	94,615
Other power-driven metal-working machinery and parts	557,851	580,522	378,067
Other Metal-Working Machinery			
Pneumatic portable tools	$137,578	$130,128	$89,811
Portable and hand and foot operated metal-working machines and parts	105,505	102,904	97,894
Chucks for machine tools	18,119	25,807	24,863
Milling cutters, machine operated threading dies and taps and similar machine-operated metal cutting tools	61,192	60,929	157,418
Other metal-working machine tools	58,188	48,667	60,333

Mill Supplies Maker Dies



H. S. DEMAREST

H. S. Demarest Was Head of Greene, Tweed & Co.

Henry Samuel Demarest, president and treasurer, Greene, Tweed & Co., manufacturer of mill supplies, New York, N. Y., died July 11 at the age of 71. Mr. Demarest had been associated with the company for over 37 years, and before that had been connected with Worthington Pump & Machinery Co.

He was a member of the American Society of Mechanical Engineers and a vice-president of the Polish-American Chamber of Commerce.

American Engineering Council Compiles Training Information

The Engineers Council for Professional Development, through its committee on professional training, under the direction of Dr. C. W. Eshback, has issued a series of six pamphlets on post-graduate engineering training available in various communities. The first deals with university extension facilities and consists of a survey of educational facilities, the scope of courses included and general information as to their availability to engineers in various localities.

The remaining five pamphlets develope the originally selected bibliovelope the originally selected bibliography of engineering subjects and available in a wide variety of fields in various localities. The pamphlets may be secured by writing to the Engineers Council for Professional Development, 29 West 39th St., New York.

BUSINESS ITEMS

Allis-Chalmers Mfg. Co., Milwaukee, is to spend $3,000,000 for plant expansion and improvement this year, according to MAX W. BABB, president. Included in the improvements are an enlargement of the agricultural tool plant at LaCrosse, Wis., and an addition to the farm tractor plant at West Allis.

Lewis Foundry & Machine Co., Pittsburgh, subsidiary of Blaw-Knox Co., has increased its total floor space by approximately 50%.

The Electro-Motive Corp. has under way another addition to its Diesel locomotive plant at LaGrange, Illinois. A one-story building having approximately 33,000 square feet will be used for the manufacture of the Winton two-cycle Diesel engines and will supplement the facilities of the Winton plant in Cleveland.

Pontiac Motor Division, General Motors Corp., Pontiac, Mich., is adding approximately 60,000 sq.ft. of floor space, according to HUGH J. KLINGLER, general manager. One building will be used to house a school for plant apprentices, another will add to the foundry space, the third will be used for plant administration.

Snap-On Tool Co., Mt. Carmel, Illinois, will begin operations in its new plant on August 1st.

The Roller-Smith Co., manufacturers of electrical measuring and protective apparatus, New York, announces the appointment of H. R. KIMBALL, 176 Federal St., Boston, as its agent for New England.

The Linde Air Products Co., unit of Union Carbide & Carbon Corp., announces that work will start immediately on the construction of a plant for the production of oxygen in South Chicago, Ill.

The Torrington Mfg. Co., Torrington, Conn., designers and builders of special machinery for the manufacture of ferrous and non-ferrous strips, sheets, tubes rods, wire and cable is entering into the field of spring making machinery with several new designs.

Modern Grinder Manufacturing Co., Milwaukee, has leased the Gurney Refrigerator Co. plant at Brook St. & Forest Ave., to manufacture grinders, hydraulic jacks, etc.

Deere & Co., manufacturer of agricultural instruments, Moline, Ill., purchased the plow factory of Killefer Mfg. Corp., Ltd., Los Angeles. O. P. ROBB, vice-president and general manager, said there would be no change in name and personnel.

General Electric Co. is adding 6400 sq. ft. to its Hotpoint plant at Ontario, Calif.

Iron & Steel Products, Inc., are moving to their new 27-acre plant site on July 17. After that date their general offices will be at East 135th St. and C.S.S. & S.B.R.R., Chicago.

American Engineering Co., Philadelphia, announce that SIMEON JESTER, JR., has been transferred to the Chicago office. Mr. Jester will supervise the western sales of the Hele-Shaw Pump and Lo-Hed hoist.

Ideal Commutator Dresser Co., Sycamore, Ill., has purchased the "Revolution Counter" business of the Belden Manufacturing Co. Hereafter this product will be marketed and manufactured at Sycamore.

Census Bureau Announces Results of 1935 Machine Tool Accessories Survey

Manufacture of machine tool accessories and machinists' precision tools in the United States reported striking increases in employment and production in 1935 as compared with 1933, according to preliminary figures compiled from the returns of the recent Biennial Census of Manufactures, released by Director William L. Austin of the Bureau of the Census, Department of Commerce.

The total value of machine tool accessories and machinists' precision tools made in 1935 amounted to $104,938,871, an increase of 123.9 per cent as compared with $46,878,356 reported for 1933. More than half of the total for each year was contributed by attachments and fixtures, made to the value of $58,490,850 in 1935 and $25,894,336 in 1933. Small cutting tools and tool holders accounted for $39,366,670 of the 1935 total and $17,509,255 of the 1933 total.

These manufacturers employed 23,135 wage earners in 1935, an increase of 81.4 per cent over 12,757 reported for 1933. Wages paid increased 143.0 per cent, from $14,159,179 to $34,413,847.

The machine tool accessories and machinists' precision tools industry, as constituted for census purposes, embraces establishments whose chief products are attachments and accessories for machine tools, such as dies, jigs, fixtures, and special tools, as well as milling cutters, taps and dies, twist drills, reamers, etc. The classification also covers precision measuring tools, such as micrometers, verniers, gauges.

Table 1.—Summary for the Industry: 1935, 1933 and 1929

(Because they account for a negligible portion of the national output, plants with annual production valued under $5,000 have been excluded)

	1935	1933	1929	Per cent of increase or decrease (–) 1933–1935	1929–1935
Number of establishments....	731	587	722	24.5	1.2
Wage earners (average for the year)[1]	23,135	12,757	26,682	81.4	–13.3
Wages[2]	$34,413,847	$14,159,179	$51,084,540	143.0	–32.6
Cost of materials, fuel, and purchased electric energy[3]..	$26,904,298	$10,882,467	$26,992,631	147.2	– 0.3
Value of products[3].....	$96,837,534	$44,383,246	$144,410,890	118.2	–32.9
Value added by manufacture[3].	$69,933,236	$33,500,779	$117,418,259	108.8	–40.4

[1] Not including salaried officers and employees. Data for such officers and employees will be included in a later report. The item for wage earners is an average of the numbers reported for the several months of the year. In calculating it, equal weight must be given to full-time, and part-time wage earners (not reported separately to the Bureau of the Census), and for this reason it exceeds the number that would have been required to perform the work done in the industry if all wage earners had been continuously employed throughout the year. The quotient obtained by dividing the amount of wages by the average number of wage earners can not, therefore, be accepted as representing the average wage received by full-time wage earners. In making comparisons between the figures for 1935 and those for earlier years, the possibility that the proportion of part-time employment varied from year to year should be taken into account.

[2] Profits or losses can not be calculated from the census figures because no data are collected for certain expense items, such as interest, rent, depreciation, taxes, insurance, and advertising.

[3] Value of products less cost of materials, fuel, and purchased electric energy.

Table 2.—Products, by Kind and Value: 1935 and 1933

1. Machine Tool Accessories and Machinists' Precision Tools industry, all products, total value	$96,837,534	$44,383,246
2. Machine tool accessories and machinists' precision tools	82,750,736	38,740,878
3. Other products (not normally belonging to the industry), value	12,687,808	4,929,567
4. Receipts for contract, custom, and repair work	1,398,990	712,801
5. Machine tool accessories, etc., made as secondary products in other intries, value	22,188,135	8,137,478
Machine tool accessories and machinists' precision tools, aggregate value (2 and 5)	104,938,871	46,878,356
Attachments and fixtures, toal value	58,490,850	25,894,336
General equipment:		
Chucks (lathe)	1,003,433	
Chucks (magnetic)		714,031
Chucks (drill), and chucks and face plates not reported separately	164,442 705,247	
Vises (machine)	161,308	81,099
Attachments for machine tools:		
Lathe (engine)	228,625	103,721
Boring-machine	110,127	804,637
Drilling-machine	429,143	
Milling-machine	488,594	
Other machine-tool attachments	627,735	98,563
Special equipment:		
Jigs and fixtures	6,319,615	
Subpresses, punches, dies, etc., for punch, stamping, and forming presses, etc	17,753,629	
Semifinished products (die sets) and accessories:		
Die sets	1,420,730	
Leader pins and bushings, dowel pins, die springs, jig bushings, etc	964,928	
Die-casting and drop-forging dies	1,697,789	22,500,685
Tools for screw and automatic machines (box tools, hollow mills, work and tool holders, etc.)	1,571,231	
Specially-designed tools	5,427,853	
Special machinery (other than machine tools) and model and experimental work	1,981,446	
Special equipment not reported separately	14,434,151	
All other attachments and fixtures	3,000,824	1,591,600
Small cutting tools and tool holders, total value	39,366,670	17,509,255
Arbors and collars	155,059	164,477
Collets or sockets, etc. (lathe, milling-machine, and drill)	343,445	
Counterbores	507,095	56,093
Countersinks and combination countersinks and drills	355,780	104,399
Drills (carbon)	1,938,215	
Drills (high-speed)	7,043,024	4,508,073
Hobbing cutters	2,131,237	483,784
Lathe, planer, and shaper tools (not including tool holders)	442,559	[1]
Milling cutters (all types), end mills, slotting cutters, etc., (solid and with inserted teeth):		
Solid	5,262,392	2,446,673
Inserted-tooth	1,786,489	1,211,514
Milling cutters and drills and reamers not reported separately	1,112,420	.....
Reamers (solid, expansion, and inserted-blade):		
Carbon	1,093,671	1,220,359
High-speed	2,090,308	
Threading tools:		
Taps and dies (not pipe-threading):		
Taps (carbon)	1,932,483	1,347,588
Taps (high-speed)	1,873,829	
Dies (carbon)	862,881	651,534
Dies (high-speed)	650,002	
Chasers	1,789,240	1,017,760
Pipe-threading:		
Taps	423,787	405,490
Dies	475,403	456,339
Chasers	134,241	[1]
Pipe stocks complete with dies	1,305,541	649,890
All other cutting tools, tool holders, mandrels, etc	5,657,569	2,285,282[2]
Precision measuring tools (micrometer and vernier)	1,182,576	185,868
Gauges (plug, ring, snap, thread, etc.)	1,331,676	761,060
Other measuring tools	1,574,575	617,760
Miscellaneous equipment and accessories not included above:		
Wheel-truing (diamond-point and other)	671,270	[1]
Machine tool accessories, etc., not reported by kind	.....	1,910,077
Other	2,321,254	[1]

[1] No data.
[2] Includes value of small tools not reported by kind.

PERSONALS

RAE F. BELL, formerly vice-president of A. O. Smith Corp., Milwaukee, has been made first vice-president, a newly created office. RUDOLPH FURRER was made vice-president in charge of engineering.

BENJAMIN BOALT, Des Moines, Iowa, has been made vice-president, Perfex Corp., manufacturer of automatic controls for heating air conditioning and refrigeration equipment, in Milwaukee. Since 1931 he has been a director and vice-president of the Penn Electric Switch Co., Des Moines.

CHARLES P. FRANCHOT has been elected president and general manager, Burden Iron Co., Inc., Troy, N. Y. JOSEPH W. BURDEN is now chairman of the board. O. A. VAN DENBURGH, JR. was made vice-president in charge of operations. HAROLD C. HENRY, was made vice-president and general sales manager.

G. W. MOTHERWELL has been appointed manager of the newly completed forge division of the Opel Works, General Motors Corp., Germany.

ROBERT H. FULTON JR., is now secretary and treasurer of the Aluminum Goods Manufacturing Co., Manitowoc, Wis. He fills the vacancy caused by the resignation of JOHN F. WALTON, JR.

B. F. GEYER has been elected president, Wayne Pump Co., Fort Wayne, Ind. He succeeds the late W. M. GRIFFIN. Mr. Geyer has been with the company for more than 25 years.

A. R. PIPP has been elected president and general manager of Angle Steel Stool Co., manufacturer of tool cabinets, steel desks and chairs, Plainwell, Mich. He succeeds the late C. E. PIPP.

H. L. BUSCHMAN is now vice-president in charge of manufacturing, and A. G. HOPKINS, vice-president in charge of equipment, National Can Co., subsidiary of McKeesport Tin Plate Corp., McKeesport, Pa.

D. W. LAMOREAUX, formerly vice-president, Peerless Equipment Co., electric supplies, succeeds A. A. HELWIG, resigned, as president.

GEORGE E. SMITH, formerly superintendent of melting and forging, Midvale Co., Philadelphia, has been made general superintendent.

J. L. TERRY, president, Q. & C. Co., railway equipment manufacturers, New York, has also been elected treasurer. M. ISELDYKE, JR., formerly secretary, has been made vice-president. R. R. MARTIN is now secretary and assistant treasurer.

OBITUARIES

HENRY F. ARNOLD, for 43 years superintendent and for 62 years an employee of the American Tool & Machine Co., Hyde Park, Mass., died July 10 at the age of 87.

JOSEPH T. TOWLSON, well-known contributor to *American Machinist*, died June 20 at the age of 76. Mr. Towlson will be remembered as a faithful contributor to "Ideas From Practical Men" and "Round Table," as well as the writer of short articles.

EXPORT OPPORTUNITIES

* Interested American firms and individuals may obtain the names and addresses of the foreign firms making these inquiries upon application to the Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce, Washington, or any district or cooperative office. Please refer to key number.

Agricultural crop drying and dehydrating equipment. (Purchase.) Southampton, England. *3630.

Baling presses, electrically operated, for waste paper. (Purchase and Agency.) Southampton, England. *2609.

Pharmaceutical machinery. (Purchase and Agency.) Habana, Cuba. *3629.

Air-conditioning equipment. (Purchase.) Torreon, Mexico. *3659.

Bottle-manufacturing machinery (molding and shaping), vacuum pump for removing pressure on boiling liquid; and pharmaceutical emulsifier. (Purchase.) Manila, P. I. *3686.

Metal-cutting machine, oxyacetylene. (Purchase.) Nantes, France. *3657.

MEETINGS

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, Pacific Coast Convention. Spokane, Wash., August 31–September 3. H. H. HENLINE, secretary, 33 West 39th St., New York.

INDUSTRIAL RELATIONS CONFERENCE. Twentieth annual meeting. Silver Bay-on-Lake George, N. Y., August 25–28. J. M. GROVES, executive secretary, 347 Madison Ave., New York.

ASSOCIATION OF IRON & STEEL ENGINEERS. Annual meeting combined with Iron & Steel Exposition, Stevens Hotel, Chicago. Sept. 28–Oct. 1.

MASTER BOILER MAKER'S ASSOCIATION. Annual meeting, Hotel Sherman, Chicago. Sept. 29–30. A. F. STIGELMEIER, secretary, 29 Parkwood St., Albany, N. Y.

PATENTS

July 6, 1937

Metal-Working Machinery

Electroplating Machine. John R. Cox, Lakewood, and Alfred A. Abramoska, Parma, Ohio, assigned to Thompson Products, Inc., Cleveland. Patent 2,085,730.

Heat Hardening Machine. Donald J. Campbell, Spring Lake Township, Ottawa County, Mich., assigned to Campbell, Wyant & Cannon Foundry Co., Norton Township, Mich. Patent 2,085,790.

Drawing Press. Rudolph W. Glasner, Chicago. Patent 2,085,799.

Welding Machine. Fred J. Krause, Chattanooga, Tenn., assigned to The Hedges-Walsh-Weidner Company, Chattanooga. Patent 2,085,808.

Spot Welding Machine. Chester A. Frick, Muncie, Ind. Patent 2,085,967.

Apparatus for the Continuous Extrusion of Metals. Harry Hill, Sydney Beckinsale, Abbey Wood, and Walter French Slater, London, England, assigned to Henley Extrusion Machine Co., Ltd., London. Patent 2,085,977.

Apparatus for Extrusion of Materials in the Plastic State. Harry Hill, Sydney Beckinsale, Abbey Wood, and Walter French Slater, London, and Percy Dunsheath, Sidcup, Kent, England, assigned to Henley Extrusion Machine Co., Ltd., London. Patent 2,085,978.

Method and Apparatus for Shearing Metal Strip. Lorenz Iversen, Pittsburgh, assigned to Mesta Machine Co., Pittsburgh. Patent 2,085,981.

Apparatus for Cold Rolling Axle Journals. William L. Scribner, Canton, Ohio, assigned to The Timken Roller Bearing Co., Canton. Patent 2,086,051.

Plating Apparatus. Clayton M. Hoff, Lakewood, Ohio, assigned to E. I. du Pont de Nemours & Co., Wilmington, Del. Patent 2,086,226.

Precision Boring Machine. Curt Pleger, Vienna, Austria, assigned to Ernst Krause & Co. A. G., Vienna. Patent 2,086,284.

Apparatus for Heating the Ends of Rods, Bars, Tubes, or the Like. Reginald Asline Bedford, Stumperlowe, Sheffield, England. Patent 2,086,290.

Machine for Working on Curved Shafts or the Like. Carl Gustaf Ekholm and Karl John Williams Janson, Lidkoping, Sweden, assigned to Lidkopings Mekaniska Verkstads Aktiebolag, Lidkoping. Patent 2,086,492.

Surfacing Machine. George M. Curtin Gloversville, N. Y., assigned to Behr-Manning Corp., Watervliet, N. Y. Patent 2,086,516.

Parts and Mechanisms

Gear Speeder. Joseph C. Drader and William H. Bock, Detroit, assigned to Michigan Tool Co., Del. Patent 2,085,850.

Machine Tool Transmission and Control. Joseph B. Armitage, Wauwatosa, assigned to Kearney & Trecker Corp., West Allis, Wis. Patent 2,085,888.

Lathe Attachment (Detachable Driving Head). William F. Biskup, St. Paul, Minn. Patent 2,085,945.

Lathe Carriage Feed Mechanism. Max A. Lehmann, Richmond Heights, Mo., assigned to Lehmann Machine Co., St. Louis, Mo. Patent 2,085,985.

Hydraulically Operated Steady Rest. Carl G. Flygare, Worcester, Mass., assigned to Norton Co., Worcester. Patent 2,086,024.

Apparatus for Cold Rolling Axle Journals. William L. Scribner, Canton, Ohio, assigned to The Timken Roller Bearing Co., Canton. Patent 2,086,051.

Machine Tool (Overload Release). Robert A. Schafer, Richmond, Ind., assigned to The National Automatic Tool Co., Richmond. Patent 2,086,095.

Apparatus for Control of Machine Tools. Clifford A. Bickel, Sidney, Ohio, assigned to The Monarch Machine Tool Co., Sidney. Patent 2,086,153.

Electromagnetic Chuck. Samuel Karasick, Mount Vernon, N. Y. Patent 2,086,164.

Apparatus for Electric Welding. Frank L. Sessions, Lakewood, Ohio. Patent 2,086,305.

Speed Control for Progressive Electric Heating and Welding. Frank L. Sessions, Lakewood, Ohio. Patent 2,086,306.

Processes

Centrifugal Casting. Donald J. Campbell, Muskegon Heights, Mich., assigned to Campbell, Wyant & Cannon Foundry Corp., Muskegon Heights. Patent 2,085,726.

Method of Welding. Worthy C. Bucknam, Mechanic Falls, Maine, and George I. Jones, Buffalo, N. Y., assigned to Union Carbide and Carbon Corp., New York. Patent 2,085,896.

Heat-Treating Metal. James J. Bowden, Warren, Ohio. Patent 2,085,948.

Process of Making Edged Tools. Jean Hubert Louis De Bats, East Orange, N. J., assigned to Howard W. Dix, Scarsdale, N. Y., and Metal Carbides Corp., Youngstown, Ohio. Patent 2,086,121.

Tools and Accessories

Support for Soldering Irons. Samuel Stradling, Bridgeport, Conn. Patent 2,086,102.

Stud Setter. Ford R. Lamb, Detroit. Patent 2,086,167.

Hammer Wrench. Cecil N. Douglass, Aurora, Ill., assigned to Independent Pneumatic Tool Co., Chicago. Patent 2,086,261.

Screw Driver. Hart Jenks, Lincoln, Nebr. Patent 2,086,270.

Washer Cutting Tool. Alphonse Rapp, Brooklyn, N. Y. Patent 2,086,435.

Rotatable Bin. Arthur W. Mueller, Cincinnati, assigned to The Frick-Gallagher Mfg. Co., Wellston, Ohio. Patent 2,086,507

July 13, 1937

Metal-Working Machinery

Machine Tool (Drilling Unit). Marion L. Strawn, Rockford, Ill., assigned to The Ingersoll Milling Machine Co., Rockford. Patent 2,086,583.

Machine Tool (Multiple Spindle). Edward P. Bullard, Edward C. Bullard, and Edward P. Bullard, III, Fairfield, Gustaf R. Appelberg and Ernest H. Johnson, Bridgeport, and Frank H. Mussler, Stratford, Conn., assigned to The Bullard Co., Conn. Patent 2,086,852.

Machine Tool (Semi-automatic). Fritz Kopp, Ulm-on-the-Donau, Germany. Patent 2,086,915.

Enameling Furnace. Lee Wilson and James C. Woodson, Cleveland, assigned to Lee Wilson. Patent 2,086,971.

Bolt Making Machine. John H. Friedman, Tiffin, Ohio, assigned to The National Machinery Co., Tiffin. Patent 2,087,087.

Automatic Screw Machine. John W. Lee, Dayton, Ohio. Patent 2,087,109.

Parts and Mechanisms

Hone. Harold L. Blood, Worcester, Mass., assigned to The Heald Machine Co., Worcester. Patent 2,086,660.

Wheel Positioning Device for Gear Grinders. Hubert D. Tanner, West Hartford, Conn., assigned to Niles-Bement-Pond Co., New York. Patent 2,086,750.

Stroke Control Adjustment for Machine Tools. Gustaf R. Appelberg, Bridgeport, Conn., assigned to The Bullard Co. Patent 2,086,837.

Bimotor Feed Works. Edward C. Bullard, Fairfield, Conn., assigned to The Bullard Co. Patent 2,086,845.

Feed Works. Edward C. Bullard, Fairfield, Conn., assigned to The Bullard Co. Patent 2,086,846.

Machine Tool Spindle Mechanism. Edward P. Bullard, Fairfield, and Ernest H. Johnson, Bridgeport, Conn., assigned to The Bullard Co. Patent 2,086,847.

Lock Pin Assembly. Edward P. Bullard, Fairfield, Conn., assigned to The Bullard Co. Patent 2,086,848.

Carrier Mechanism. Edward P. Bullard, Fairfield, Conn. and Ernest H. Johnson, Bridgeport, Conn., assigned to The Bullard Co. Patent 2,086,849.

Binding Device. Edward P. Bullard, Fairfield, Conn., assigned to The Bullard Co. Patent 2,086,850.

Machine Controller. Edward P. Bullard, III, Fairfield, Conn., assigned to The Bullard Co. Patent 2,086,851.

Welding Apparatus. Lynn S. Burgett, Euclid, Ohio, assigned to Una Welding, Inc., East Cleveland, Ohio. Patent 2,087,057.

Self-Opening Die-Holder. George H. Cote, Bridgeport, Conn. Patent 2,087,084.

Welding Apparatus. John B. Austin, East Cleveland, Ohio, assigned to Una Welding, Inc., East Cleveland. Patent 2,087,225.

Processes

Process of Making Tappet Screws. Howard A. Hayden, Detroit. Patent 2,086,801.

Bearing Metal, Bearing and Method of Producing Same. William Harold Bagley, Bruce R. Bagley and Ralph William Berdan, Detroit, assigned to Bagley Berdan Co., Detroit. Patent 2,086,841.

Art of Making Nuts. Albert Stoll, Detroit, assigned to Clare L. Brackett, Detroit. Patent 2,087,053.

Tools and Accessories

Vibrometer. Fidel Cordero, Washington, D. C. Patent 2,086,539.

Electric Welder. Earl S. Taylor, Detroit, assigned to Swift Electric Welder Co., Detroit. Patent 2,086,784.

Electric Reciprocating Hand Tool (Saw). Leonard F. Carter, Colorado Springs, Colo. Patent 2,087,018.

Maintenance Machinist

JOHN J. HILL

I OFTEN WONDER if there can possibly be a better place anywhere in the world to learn the practical all-around machinist trade than in a small maintenance repair shop. Of course, the modern streamlined argument is that there is no more demand for mechanics of this type.

However, in our shop, which is in the class referred to, they are the kind of mechanics that are found to be the most valuable. In a shop of this kind, the jobs are so varied, that the work never gets monotonous, and there is always something new turning up every day; so much so, that some of us, after having been at it for ten, twenty, and thirty years, are beginning to wonder if we are ever going to finish "learning the trade."

Here an opportunity for a man to use his ingenuity and skill presents itself more often than on any other line of work; for quite often we find ourselves lacking either proper equipment or materials, or both, with which to work, making it necessary sometimes to rig up all sorts of makeshift equipment. Results, however, are what we must get and not be too long about it either. Therefore, we must work with what we have on hand with which to do it.

Of course, there are those who theorize that if the equipment is "kept up," there should not be any breakdowns. Therefore, there would be no need for all-around machinists. I have often heard arguments of that nature coming from the direction of the main office. Regardless of these arguments, however, accidents to equipment will, and do, "happen in the best regulated families." Especially when it is taken into consideration that some of it may date slightly farther back than last year's model. It may even go back to, say, twenty, thirty and forty years, and still going strong, as the case happens to be in the plant of which our shop is a part.

Our work, in many respects, compares very closely with the doctor's work, except that in his case, it is called a profession. For instance, many times I, like the doctor, have been disturbed from my slumbers at all hours of the night. Sometimes the call would only be to give the operators a little fatherly advice, and unlike the doctor, I have never been able to collect fees comparable to his, for services rendered. Or perhaps it would be a case in which a gear had developed a bad case of toothache in the middle of the night. And, after a more or less hurried check-up of the stock on hand, not forgetting the old standby, the scrap pile, I have had to decide then and there, which would be the quickest way to get that gear back in service. Either by putting in a piece of bridgework, or just a few fillings, in the shape of pegs drilled and tapped into the rim of the gear, and afterward chipped and filed to a gage made of a piece of thin sheet metal, and previously fitted to the good teeth adjoining the missing molars. Or, it may be a more serious case calling for a major operation with the insides of some balky pump that is supposed to be furnishing the life blood of some vital process absolutely necessary in the production of sheckels for the stock-holders, which in the final analysis, is what keeps the wheels going around.

So, if the old-time all-around machinist is no longer needed, then what would be the modern name for the trade (or would it be a profession?)

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of the man, or group of men, that would be called on to service equipment that has a habit of breaking down and wearing out? And also, where would one find a better place to learn this line of work than in the small maintenance repair shop? Perhaps some may suggest that this work belongs to the millwright. But I, for one, claim that this is not so. If I were to have the honor of naming the trade, I cannot think of a more appropriate and descriptive name than that of "maintenance machinist."

Answer to Drawing Puzzle

NAMES of several contributors who solved the drawing problem (*AM*—Vol. 81, page 10) were published under above title (*AM*—Vol. 81, page 151). Since then several additional correct solutions have been received, together with several variations. Correct solutions were presented by William A. Andresen, John S. Balint, E. V. Cyran, H. E. Erickson, Robert Hutcheson, Francis W. Shaw and J. T. Towlson. An alternate solution involving a curved depression, as shown dotted in Fig. 1, was suggested by Robert Hutcheson and Paul C. Bruhl.

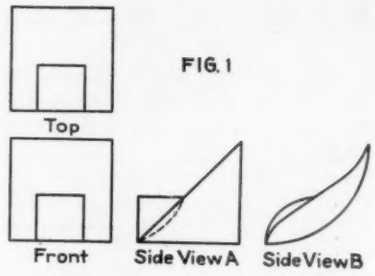


FIG. 1

According to Francis W. Shaw two views do not always define a solid, as some detailers believe, even if all the hidden lines are shown dotted. This "puzzle" should be an excellent lesson to creators of communications between drafting room and shop.

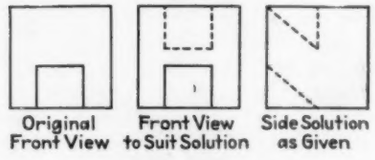


FIG. 2

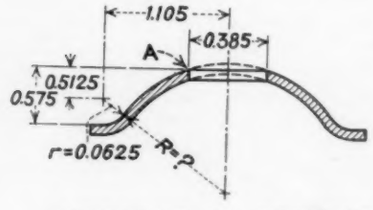
Mr. Shaw submits the two solutions shown by solid lines in side views *A* and *B*, Fig. 1. He assumes that the given front and top views are complete and that there were no hidden lines. It is obvious that the curves in *B* may have innumerable forms without showing a line of demarcation. But the object might be of thin sheet metal or wire, when the end view might have two more infinitudes of different shapes.

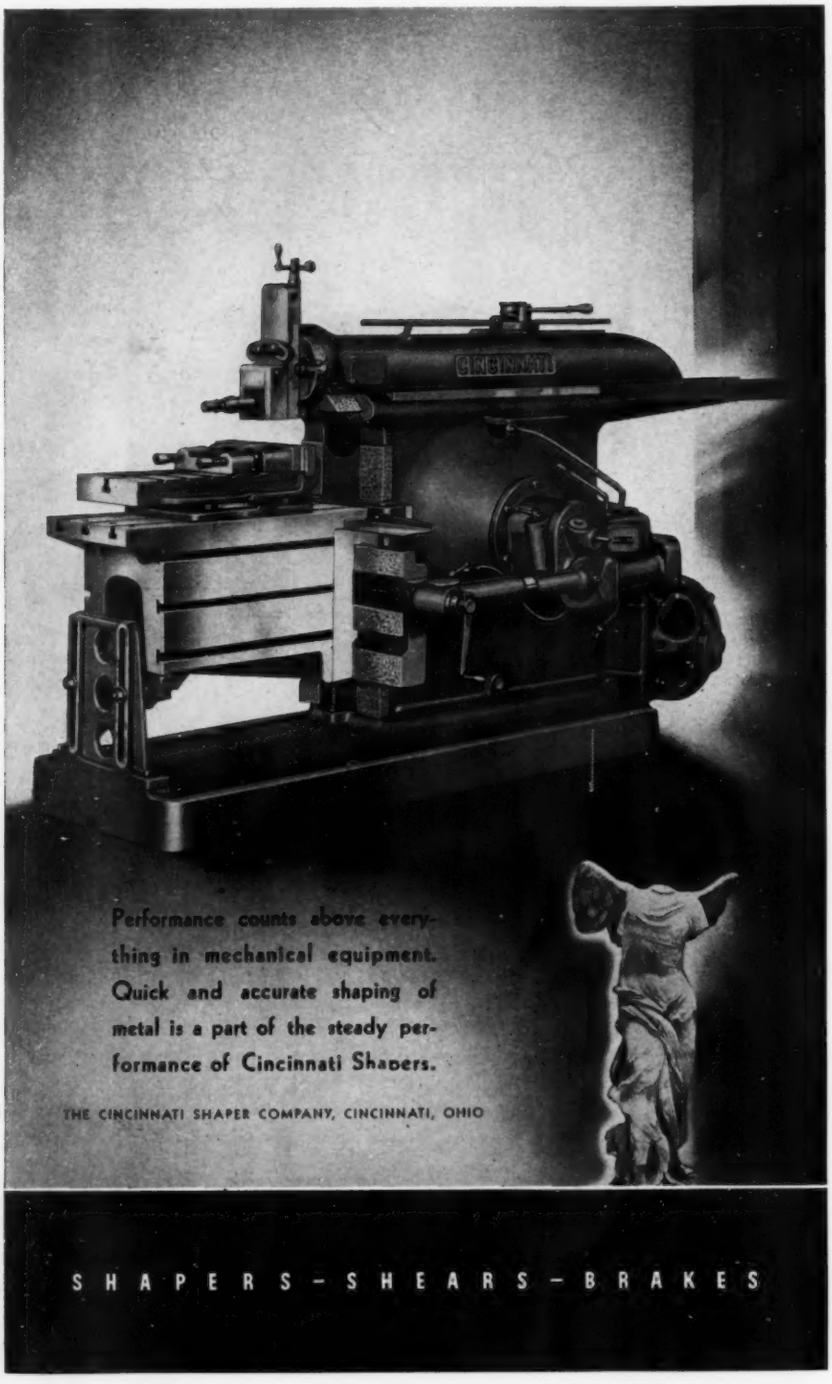
Criticisms of Mr. Bruhl's suggested solution (*AM*—Vol. 81, page 151) have been received from the following persons: John Balint, E. V. Cyran, Stan Wecksler, Henry Briechle and Joseph Giacobbe, who believe that the dotted line will be necessary as shown in the front view, Fig. 2.

What Is the Radius?

HEINZ A. MUELLER

SOMETIMES the occasion arises when the location of a radius such as $r = 0.0625$ in. and a point *A* on a dome-

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like part are given. It is required to find the radius R which will pass through the point A and be tangent to the radius r. Can you solve the problem? A list of successful contributors will be published in a forthcoming number.

Cutting-Oil Feed for Small Drills

FEW SENSITIVE drilling units, particularly of the bench type, are equipped to feed cutting-oil to the point of the drill. Even though small drills are properly made and correctly ground and the spindle and chuck rotate without vibration in well supported bearings, drill breakage is common. Ordinarily cutting-oil is applied to small drills with a brush, which has been dipped in a container of oil. This, at best, is a makeshift method. Feed is intermittent and the oil is contaminated with small chips carried back and forth on the brush.

An inexpensive feed unit is in use in the drill press section at International Business Machines Corporation's Endicott plant. This unit, assembled from a can, a length of copper tubing, some soft-iron wire and a few drops of solder, provides a continuous flow of clean oil to the drill. Its use has reduced drill breakage, increased production and made easier the drilling of small holes to close limits of size and finish in a wide range of parts.

A can, some copper tubing and a short length of soft-iron wire have been effectively combined to form an inexpensive lubricator for drills

One end of the copper tube is soldered to the side wall of the can, near the bottom, where a small hole has been punched. A length of $\frac{1}{32}$-in. soft-iron wire is then soldered to the other end of the tube.

Oil flowing through the tube, is led to the drill by the wire. Rate of flow is adjusted by pinching the end of the copper tube with a pair of pliers.

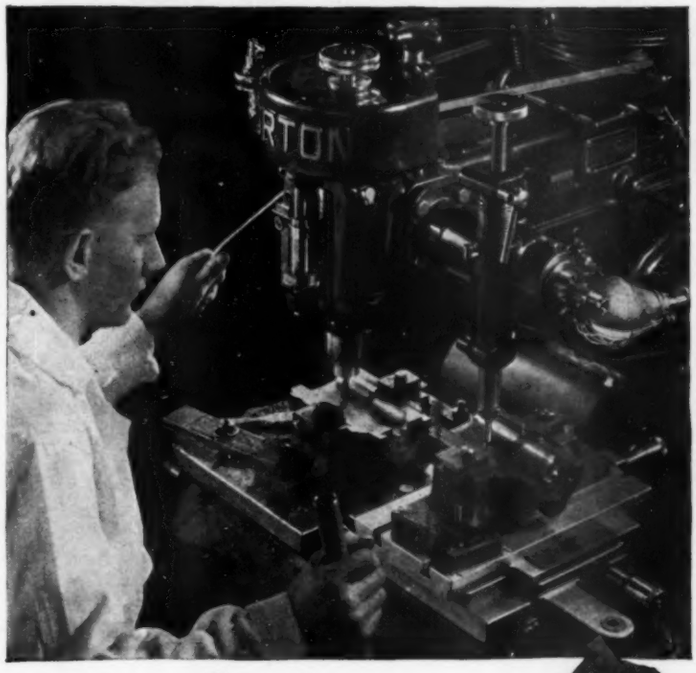
When first set up, the free end of the iron wire was placed close to the rotating drill and the oil permitted to drip beside the hole. With this arrangement the oil was thrown aside by the rapidly moving drill and the wire wes shifted by chips rising from the hole.

A small loop, twisted in the free end of the wire, has effectively eliminated both of these difficulties. The loop encircles the drill with just enough clearance to prevent rubbing.

Oil, flowing around the loop, flows rather than drops onto the drill and runs down the drill into the hole. Chips cannot move the wire, as the loop holds it in place.

The supply can may be placed on blocks, as shown in the illustration, or can be hung by a bail from a convenient support. Drills up to $\frac{1}{4}$-in. diam-

★ GORTON DUPLICATORS



Once is Enough to
Make an Original Die

Production of dies and molds from drawings, even with the help of modern die sinking machines, takes time and skill, both expensive and tending to get more so. Why waste them by starting from scratch every time duplicates are needed?

You can cut in half or less the cost of making duplicate dies and molds with a Gorton Duplicator. Any good mechanic can reproduce from originals or masters within tolerances of .001". No pattern is too complex for them to follow accurately.

Example No. 1347

Bottle mold. Formerly routed out on milling machine in 2 hours. Finished to .003" of size on 8½D Duplicator in 25 min.

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1103 13TH ST., RACINE, WIS.

eter have been successfully lubricated with the unit shown.

Gear Design

A RECENT photoelastic investigation of relative stresses in solid spur gears has been reported in the University of Illinois Engineering Experiment Station Bulletin No. 288. This investigation, conducted by Paul H. Black, indicates that the best location of the keyway for solid spur gears, on the basis of lowest stress, is that in which the center-line of the keyway is in line with the center-line of a tooth space. The poorest location is that in which the center-line of the keyway is in line with the center-line of a tooth.

The maximum bore that should be used in a solid spur gear having Brown & Sharpe teeth for equal maximum tensile stresses in the gear, based on the photoelastic method, is given by the following equation, where d represents the maximum allowable bore in the gear, D the pitch diameter, and T the number of teeth on the gear:

$$d = D\ (0.50 + 0.0344\sqrt{T - 12}).$$

This equation, which allows for a square key whose sides are one-quarter the diameter of the shaft, applies only when the center-line of the keyway is in line with the center-line of a tooth space. In addition, it strictly applies only for the numbers of teeth covered in this investigation, namely, 12 to 24. For gears having a larger number of teeth than 24, the equation may be used to obtain an approximate maximum bore by taking T equal to 24 in the equation.

This investigation also shows that, based on the tension fillet of the gear tooth, the Lewis equation gives stresses that are from 35 to 47 per cent lower than those determined by the photoelastic method.

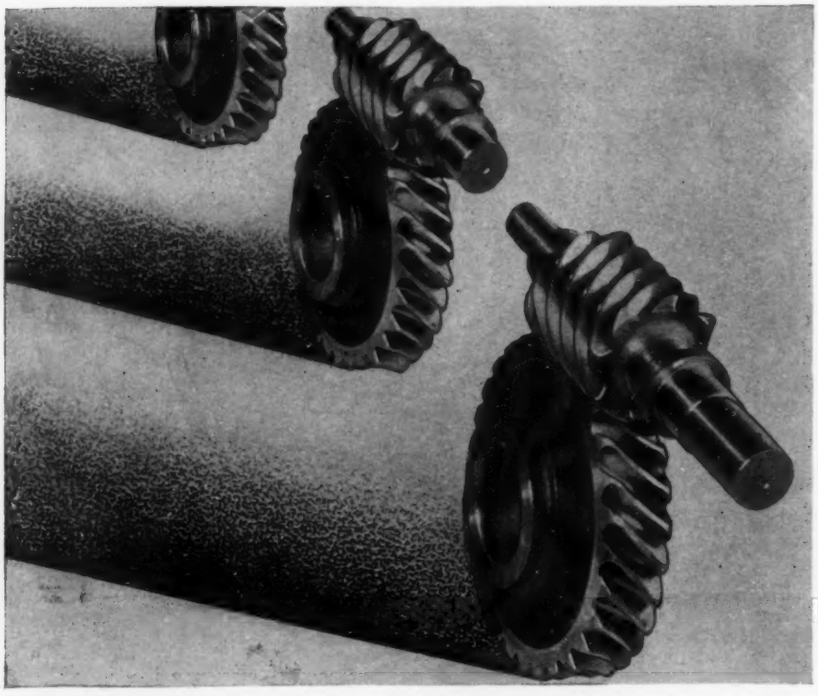
Abstracted from University of Illinois, Engineering Experiment Station, Bulletin No. 288.

Personal Responsibility

HENRY C. FRANCIS

A WORKER'S NAME on his machine is not new; it has been found effective in a number of shops over a period of years. But the illustration shows the first use of this on repair work that I have seen.

This is in the service station of the C & H Motor Company in Orlando, Fla. Each man has a bench and two cupboards with his name on the wall above. Cars for repairs of any kind are nosed into a work space as can be seen from the front fender, and any work necessary is done in this location. Special racks for holding pis-



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tons and other engine parts are available when necessary, as are special tools not included in the average repair kit.

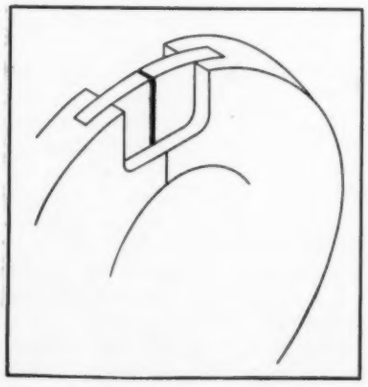
Customers know the man who did their work and can return to him, or avoid him, as the case may be. Personality is established between the shop and the customer, and both men and management feel that the results are most satisfactory.

Welded Joints in Wear Plates

THERE ARE many ways of fastening wear plates of the floating variety together after they are placed around the axle. One method was shown as

being used at the Sayre shops of the Lehigh Valley R.R. (*AM*—Vol. 81, page 420). Another method is shown here, both with a plate in place and a detail of the fastening itself.

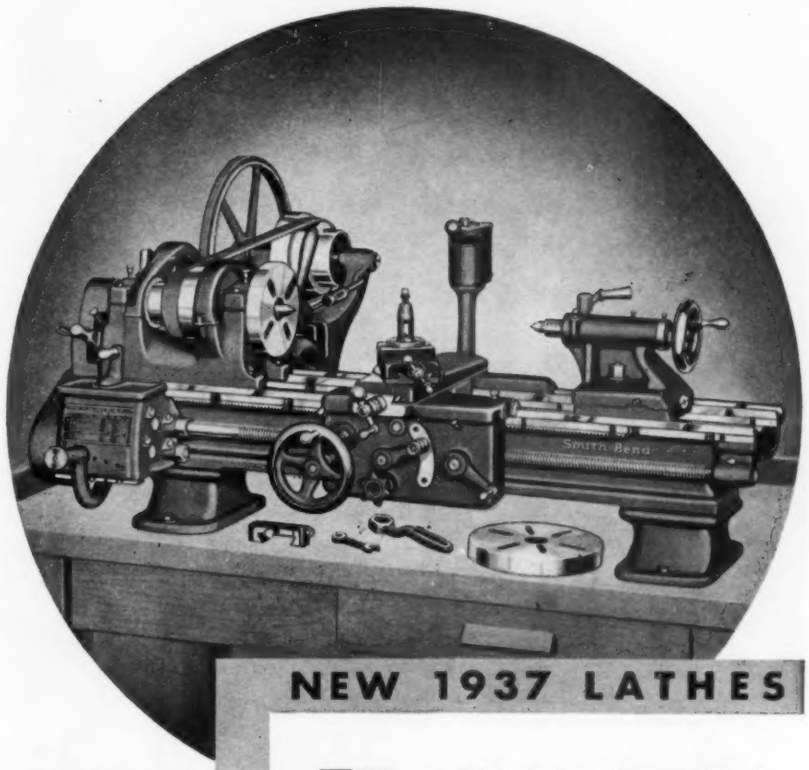
The plates are cast in halves, but are held together after the joint is faced, by a suitable chuck. At the outer end of each joint face there is a recess in which a piece of low carbon steel has been cast when the brass is poured. After the plates are turned, faced, drilled and countersunk the two halves are placed around the axle and the steel inserts welded together with either an arc or a torch. Only a light weld, little more than a "tacking," is necessary. They are easily cut apart when necessary but hold solidly while in service.



Benefits of Technology

SUCCESS of a technological civilization depends upon the benefits of machinery being enjoyed by consumers as well as producers, employees as well as employers. It further depends upon a general appreciation of the relation of technology to the average family. Widespread knowledge of the contribution of technology to the American standard of living will lead to greater cooperation in obtaining maximum benefit from technological developments.

Comparison of present conditions and those existing some twenty years ago lead to the conclusion that the American consumer participates in the benefits of technology (a) by a greater variety of commodities available on the market; (b) by adequate supplies of goods; (c) by higher wages than are paid in any other country; (d) by lower prices for commodities than would be possible with-



NEW 1937 LATHES

No. 409YN 9" x 3' Quick Change Gear Horizontal Motor Drive Bench Lathe as shown. Wt. 471 lbs. $345.00

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SOUTH BEND *Precision* LATHES
MODERN LATHES FOR MODERN INDUSTRY

out technological efficiency; (e) by a continued increase in quality of product; and (f) by constant improvement in the purchasing power of his income—the relationship of his earnings to prices of machine-made commodities.

The history of mankind is a story of struggle for the necessities of life. Abundance has always been out of reach and famine never far out of sight. The abundant resources of the United States have contributed greatly to helping solve the problem of producing enough goods for its inhabitants, but an important role has also been played by the manufacturing industries which have led the world in developing progressive production methods. American progress in production has been so great that many believe it has outstripped distribution.

It is generally recognized that both the variety and volume of commodities manufactured in the United States are made possible by mass production which depends upon machinery. Contribution of machinery to mass consumption is no less important. It makes possible widespread distribution of goods (1) by increasing the earning power of consumers; and (2) by reducing the price at which commodities are offered for sale.

More than two-thirds of the purchasing power of the people of the United States comes from wages of salary. The total national income of the United States is higher than that of any other nation and American labor is better paid than any other. Not only does the workman receive more money, but he is able to buy more with what he earns.

Wages of the American worker would buy almost twice as much as that of the British and almost five times as much as that of the Italian. Rare luxuries in other countries are accepted as necessities in America.

What determines a worker's wage? There are many factors, but one of the most important is the worker's capacity to produce—the amount of work he can do. American workers are the most productive in the world. This is especially true of factory workers. Volume of production per worker per year in every major industry is above that of other nations.

The American factory worker is undoubtedly better trained and more capable than those of other countries, and the equipment with which he works enables him to produce more per hour than can other workers. He has twice as much power at his command as the British worker and more than two and one-half times that of the French worker. It has been estimated that about $8,000 is invested in machinery and equipment for every factory job in the United States.

Increase in production has made it possible for the average factory worker to earn about 62 cents per hour in 1936 as compared to about 25 cents in 1914. Working hours declined from 51.5 per week in 1914 to about 39 in 1936, so that weekly earnings were $12.68 in the first case and about $25 in the second.

Technology affects prices chiefly by way of increased volume of production. When a Navajo Indian weaves rugs by hand it takes twice as much work to produce two as one, and the price of the second or the hundredth is little less than that of the first. An entirely different condition prevails in an industry where machinery is used and mass production methods are employed.

Price is not always a true indicator of value. Improvement in qual-

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"take all that's given them" by the Liquid Carbonic Corporation and save 4 of the 10 hours previously required for each piece

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Drill and ream 16—1-3/8" holes, 5" deep
Drill and tap 16—1/8" I.P.S.
Drill 12—17/32" holes
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Tap 8—5/16" holes

Floor to floor time is six hours per piece—a saving of 4 hours over previous methods. Work is held to close limits of accuracy.

What the Liquid Carbonic Corporation thinks of these machines is obvious from the fact that 8 Cincinnati Bickford Radials are taking all they can give them in this shop.

Our engineers will gladly show you how you, too, can benefit through the use of these modern, efficient, powerful machines.

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SUPER-SERVICE RADIALS

ity as a result of scientific and technological advance is often more marked than price reductions. Automobile tire manufacturers, for instance, state that a tire today will last ten times as long as the pre-war product did. The price in dollars has declined about 75 per cent, but the value in service per dollar expended has increased 3,900 per cent. Improvement in value per dollar expended for machine-made products is constantly taking place as a result of scientific and technological development.

Abstracted from "Technology and the American Consumer," published by Machinery and Allied Products Institute, 221 North La Salle St., Chicago, Ill.

TRADE PUBLICATIONS

ACCIDENT FACTS. The 1937 edition of "Accident Facts" has been published by the National Safety Council, Inc., 20 North Wacker Drive, Chicago. This is the 17th edition of this booklet, which presents, by illustrations and diagrams, the salient characteristics of the past year's national accident experience. Single copies may be secured at a price of 50 cents each.

ALUMINUM FINISH. A summary of the properties of "Blue Knight Leaflex No. 5900" cellulose type, air-drying, flexible lacquer enamel aluminum finish is given in a bulletin published by Roxalin Flexible Lacquer Co., Inc., Elizabeth, N. J.

BROACHING MACHINE. Bulletin No. PD-1, offered by American Broach & Machine Co., Ann Arbor, Mich., describes the features of and lists specifications for the Type PD hydraulic broaching machine for internal broaching operations.

CAPITAL GOODS. Machinery and Allied Products Institute, 221 North La Salle St., Chicago, Ill., announces publication of "Capital Goods and American Progress," a 27-page booklet discussing causes of sharp fluctuations in capital goods production, and the relation of the capital goods industries to employment and the American standard of living.

CHIP-PROOF ENAMEL. "Blue Knight Blax" chip-proof black flexible lacquer enamel is described in a bulletin offered by Roxalin Flexible Lacquer Co., Inc., Elizabeth, N. J.

COLMONOY PRODUCTS. Bulletin No. 60, a general catalog of Colmonoy wear-, corrosion- and heat-resistant alloys and overlay metals, has been published by Colmonoy, Inc., Los Nietos, Calif. This bulletin supercedes all previous information relative to these products and their prices.

COMMUTATOR TURNING. The "Ideal" commutator-turning tool-head for use in conjunction with either the "Ideal" or "Perfect" model commutator grinders is described in a leaflet published by Ideal Commutator Dresser Co., 1439 Park Ave., Sycamore, Ill.

CONTOUR MACHINING. A 4-page bulletin offered by Continental Machine Specialties, Inc., 1301 S. Washington Ave., Minneapolis, Minn., lists and describes features of the Model M and Model MD "Metalmaster" sawing and filing machines.

DEEP WELL PUMP STANDARDS. "Deep Well Turbine Pump" section of the Hydraulic Institute Standards

Small Hole Grinding

Mounted wheel held in chuck grinding small bore with spindle turning at 35,000 r.p.m.

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Although primarily an internal grinder, an external grinding attachment can replace the internal spindle bracket. The Rivett fixed diamond method is used for truing both internal and external wheels. For further information write for bulletin 104-C.

RIVETT LATHE & GRINDER INC.
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has been announced by the Hydraulic Institute, 90 West St., New York. Includes definitions of turbine pump parts and materials, definitions of efficiencies, methods of testing, discussion of pump troubles and other information. Price, 25 cents.

FIBRE SHEETS. A 4-page bulletin offered by Spaulding Fibre Co., Inc., Tonawanda, N. Y., discusses the physical characteristics of hard culcanized fiber sheets.

GRAPHITED BEARINGS. More than 200 sizes of cast-bronze graphited bearings are listed on a wall-card reference chart offered by Johnson Bronze Co., New Castle, Pa. Information is given on the application, tolerances and alloy specifications of these bearings.

HEATERS. "A.C.F. Berwick" Type L and Type LA electric metal heaters, equipped with photoelectric control, are described in a bulletin offered by American Car and Foundry Co., 30 Church St., New York.

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HARDNESS TESTER. Catalog No. 10, published by Wilson Mechanical Instrument Co., Inc., 383 Concord Ave., New York, N. Y., describes the "Rockwell" hardness tester and the manner in which it operates.

ILLUSTRATED PARTS LISTS. A bulletin describing a system permitting economical reproduction of illustrated parts lists is offered by Joseph S. Vogel & Co., 9 Clinton St., Newark, N. J.

INTERNAL GRINDER. Bulletin No. 112A, published by Rivett Lathe & Grinder, Inc., 20 Riverview Road, Brighton, Boston, Mass., describes the No. 112 internal grinder.

LUBRICATION. A 4-page bulletin, No. B-41, describing various applications of "Lubriplate" lubricants in textile machinery is offered by Lubriplate Div., Fiske Brothers Refining Co., 129 Lockwood St., Newark, N. J.

MERCURY VAPOR LAMPS. Bulletin No. 520, offered by General Electric Vapor Lamp Co., Hoboken, N. J., gives data regarding the improved horizontal Cooper Hewitt mercury vapor lamp.

MICROSCOPE. A 24-page booklet offered by Ernst Leitz, Inc., 50 E. 10th St., New York, describes the Leitz toolmakers' microscope which is available with a choice of template combinations and magnifications.

MICROSCOPE. The "Busch" comparison microscope permitting visual comparison of specimens with standards is offered by George Scherr Co., Inc., 128 Lafayette St., New York.

MUFFLE FURNACES. Hevi Duty Electric Co., Milwaukee, Wis., offers Bulletins No. HD-537 and No. MZ-637 describing Type HD-92 and Type MU-55 furnaces for laboratory use. These furnaces may also be used for light toolroom work.

NEOPRENE. Rubber Chemicals Div., E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has published a 24-page booklet, No. A-7594, describing the properties of "Neoprene", an engineering material with rubber-like properties.

PILLOW BLOCKS. Bulletin No. RS, published by Fafnir Bearing Co., New Britain, Conn., describes ball-bearing rubber pillow blocks using standard wide inner-ring ball bearings with self-locking collars.

V-BELT DRIVES. Catalog No. 795, published by Rockwood Mfg. Co., 1801-2001 English Ave., Indianapolis, Ind., contains a complete listing of applications for single-groove V-belts.

REFRACTORY CEMENT. Bulletin No. R-31, published by Refractory & Insulation Corp., 381 Fourth Ave., New York, N.Y., describes R & I No. 3000 Refractory Cement. This material is suitable for brick work, hot or cold patching and for wash-coating.

RIVET FORGES. Bulletin No. 200C, offered by Johnston Mfg. Co., 2825 East Hennepin Ave., Minneapolis, Minn., describes the line of oil-burning rivet forges designed for industrial and railway shops.

RIVET HEATERS. A bulletin describing "A.C.F. Berwick" electric rivet heaters are described in a bulletin announced by American Car and Foundry Co., 30 Church St., New York.

ROD STRAIGHTENER. Bulletin No. 10, published by the American Foundry Equipment Co., 555 South Byrkit St., Mishawaka, Ind., describes four models of the rod straightener and shear machine.

RUBBER HOSE. A 64-page catalog showing a complete line of braided and molded hose is announced by Electric Hose & Rubber Co., Wilmington, Del. Information is indexed according to purposes as well as kind of hose.

RUSTPROOFING. A 20-page catalog describing the "Oxoseal" method of electrodeposition of alloys for the protection of metals has been published by Oxoseal Co., Ltd., 1716-18 21st Ave. South, Seattle, Wash. This process is claimed to give a uniform deposit which forms a good bond without affecting temper or strength of the treated material.

STEELS. Bliss & Laughlin, Inc., Harvey, Ill., offer bulletins describing "Ultra-Cut" and alloy steels as well as turned, drawn, ground and polished shafting and small round stock.

SUPERFICIAL HARDNESS TESTER. Catalog Supplement No. RS-3, offered by Wilson Mechanical Instrument Co., Inc., 383 Concord Ave., New York, N. Y., describes the superficial hardness tester, a specialized form of the "Rockwell" tester, particularly adapted for use where the indentation into the work must be kept shallow or of small area.

THREADING EQUIPMENT. A bulletin featuring the use of Landis thread cutting equipment in railroad maintenance shops is offered by Landis Machine Co., Inc., Waynesboro, Pa. Threading machines and die heads are described in detail.

TRADE STATISTICS. "Sources of Current Trade Statistics," a directory of approximately 3,000 statistical series, is offered by the Marketing Research Div., Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C. Identified as Market Research Series No. 13, this publication is offered as a bibliography of agencies compiling data of primary importance in measuring economic developments and business trends. Price, 25 cents a copy.

TRAFFIC. Policyholders Service Bureau, Metropolitan Life Insurance Co., 1 Madison Ave., New York, N. Y., has completed a study entitled "Functions of the Traffic Manager."

WIRE SKINNER. The "Handi-Grip" wire skinner that can be used to cut and strip insulation, scrape the wire and straighten kinks and sharp bends is described in a folder published by Ideal Commutator Dresser Co., 1439 Park Ave., Sycamore, Ill.

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